Indonesia International Institute for Life Sciences

ENRICHMENT PROGRAM REPORT

Analysis of Energy Balance in Adult Obese Patients at Exercise Center IMERI FKUI

STUDY PROGRAM
Food Science & Nutrition

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INTERNSHIP REPORT

ANALYSIS OF ENERGY BALANCE IN ADULT OBESE PATIENTS AT EXERCISE CENTER IMERI FKUI

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CERTIFICATE OF APPROVAL

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We hereby declare that this final thesis project is from student's own work. The final project/thesis has been read and presented to i3L's Examination Committee. The final project/thesis has been found to be satisfactory and accepted as part of the requirements needed to obtain an i3L bachelor's degree.

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Acknowledged by,
Head of Study Program,
Siti Muslimatun, S.TP, M.Sc, Ph.D

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ABSTRACT

Obesity is a significantly threatening global health problem, including in Indonesia. Similar to other occupations, obesity also occur among healthcare workers, and this is a significant issue. Various efforts in obesity management have therefore emphasized weight loss through reducing food intake and increasing physical activity. Thus, it is important to discover the energy balance in medical academics with obesity. This internship project covers the proposal and conduct of health research complemented with several Sports Medicine-related institutional activities. The cross-sectional study aimed to analyze the energy balance, body composition, and physical activity level of adult obese patients at Exercise Center IMERI FKUI. A majority of the patients at Exercise Center IMERI FKUI are medical academics from FKUI in an obese condition primarily due to limited physical activity as a result of the demands of daily work duration. This phenomenon encouraged the researchers at Center for Sports and Exercise Studies Cluster to conduct an observational study. Study participants were assessed for eligibility through determination of obesity status (BMI of ≥25 kg/m^2). The selected subjects (n = 12) were then administered to body composition measurement (BIA), digital dietary assessment (MFP), and physical activity record (IPAQ-SF). This study revealed that 11 (91.67%) patients had a negative energy balance and 1 (8.33%) patient had a positive energy balance. In addition, the average body composition components and physical activity levels vary between men and women participants. Overall, the author has successfully learned to propose and conduct health research appropriately through the internship experience.

Keywords: body composition, energy balance, energy expenditure, energy intake, obesity, physical activity

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LIST OF ABBREVIATIONS

BAPPENAS	National Development Planning Agency of the Republic of Indonesia
BIA	Bioelectrical impedance analysis
BMR	Basal metabolic rate
CEEBM	Center for Clinical Epidemiology and Evidence-Based Medicine
DIKTI	Director General of Higher Education of the Republic of Indonesia
EAT	Exercise activity thermogenesis
EE	Energy expenditure
EI	Energy intake
FKUI	Faculty of Medicine, University of Indonesia
IHWG	Indonesian Hydration Working Group
IMERI	Indonesia Medical Education and Research Institute
IOCRL	University of Indonesia and Oxford Clinical Research Laboratory
IPAQ	International Physical Activity Questionnaire
IPAQ-SF	International Physical Activity Questionnaire-Short Form
IsDB	Islamic Development Bank
MERC-UI	Medical Education Research Center-University of Indonesia
MFP	MyFitnessPal application
NEAT	Non-exercise activity thermogenesis
PRVKP	*Pusat Riset Virologi dan Kanker Patobiologi*
RISKESDAS	National Health Survey of the Republic of Indonesia
RSUI	FKUI academic hospital (*Rumah Sakit Universitas Indonesia*)
RSCM	National Central General Hospital (Rumah Sakit Umum Pusat Nasional) dr. Cipto Mangunkusumo
TDEE	Total daily energy expenditure
TEF	Thermic effect of food
UNS	Sebelas Maret University (*Universitas Sebelas Maret Surakarta*)
UNAND	Andalas University (*Universitas Andalas*)

CHAPTER 1: INTRODUCTION

1.1 History

Indonesia Medical Education and Research Institute (IMERI) is an institute of medical education and research center under the Faculty of Medicine, University of Indonesia (FKUI). IMERI Building is located at Salemba, Central Jakarta. The history of the development of IMERI have been highlighted by Soemantri *et al*. (2022), through a book which summarized the journey of IMERI's establishment. In the book, it was written that the predecessors at FKUI have long for having a research center to develop medical science and technology since a long time ago. The commencement of IMERI's conceptualization can be traced 21 years before the completion of its construction, which was back in 1996. Since 1996, all of the previous Deans of FKUI–during their respective term of service period–have consistently strove to develop the faculty's management system, strategic plan, development goals, as well as the concept for a medical education and research center.

In order to achieve the establishment of IMERI, FKUI was not a single party to be involved. The development process of IMERI was supported by the Director General of Higher Education (DIKTI) and the National Development Planning Agency (BAPPENAS) of the Republic of Indonesia. The construction proposal to build FKUI Campus in Depok, FKUI academic hospital (RSUI) in Depok, and IMERI in Salemba was submitted to DIKTI. Correspondingly, BAPPENAS assisted in the coordination between FKUI and the Islamic Development Bank (IsDB), the candidate donor to fund the development and construction of the Center for Medical Education and Medical Research (i.e., the initial project name for IMERI). IsDB is a financial institution headquartered in the city of Jeddah, Saudi Arabia. Since 1978, this institution has been one of the partners of the government of the Republic of Indonesia.

The Development of Center for Medical Education and Medical Research project in FKUI received funding assurance from IsDB in 2008, and the leadership of FKUI changed to Dean Ratna Sitompul (term of service 2008-2017). Two months after being inaugurated, specifically on 19 June 2008, IsDB invited UI to a technical meeting at Sebelas Maret University (UNS) Surakarta. During the meeting, there was a discussion regarding the merge of the proposals submitted by UI with two proposals submitted by UNS and Andalas University (UNAND) into a unified project entitled 'The Development of Medical Education and Research Center and Two University Hospitals'. The merge was proposed in order to ease the administration and communication processes between BAPPENAS and IsDB regarding building construction and collaboration of the functions of the three projects. The collaboration of the three projects was expected to help solve various health problems in Indonesia. Hence, all relevant parties immediately agreed to the proposed merge of the three projects.

Adjustments in the collective vision and mission as well as the determination of each university's roles were then constructed. On 3-11 August 2009, an aide-mémoire was prepared between the government of the Republic of Indonesia and IsDB regarding technical implementation, organizational structure, and loan provisions. The document was then submitted to the Ministry of Finance of the Republic of Indonesia. In the same month, IsDB conducted an appraisal of the project and eventually issued an approval in December 2009.

After a long process of construction, at the beginning of 2017, IMERI building stood in Central Jakarta, next to the FKUI Cultural Heritage Building and the National Central General Hospital dr. Cipto Mangunkusumo (RSCM). The building possesses two towers consisting of 12 floors with an area of 27,965.23 m^2. Before its inauguration, the building which was previously called the Medical Education Research Center-Universitas Indonesia (MERC-UI), was changed to Indonesia Medical Education and Research Institute (IMERI). This alteration was inspired by one of the research institutes in Australia, Hunter Medical Research Institute, as stated by Budi Wiweko, who at that time served as the research manager. The name IMERI symbolizes the idea that IMERI may not only be useful for UI, but also for Indonesia.

IMERI was inaugurated on 12 April 2017 by the incumbent Vice President of the Republic of Indonesia, Jusuf Kalla. Bandar M. H. Hajjar (The President of the Islamic Development Bank), H. Mohamad Nasir (The Minister of Research, Technology and Higher Education of the Republic of Indonesia), Muhammad Anis (Chancellor of the University of Indonesia), and Ratna Sitompul (Dean of FKUI) attended this inauguration as well. On this occasion, Jusuf Kalla emphasized the importance of combining research and medical education, with the hope that IMERI can be useful and beneficial for Indonesia entirely, especially in the health sector.

IMERI comprises various clusters. In line with the development of science during the preparation process, 11 medical science clusters, 5 medical education clusters, and 5 core facilities were established. The medical science clusters consist of (1) Drug Development, (2) Human Cancer, (3) Human Genetics, (4) Human Nutrition, (5) Human Reproduction, Fertility, and Family Planning, (6) Infectious Disease and Immunology, (7) Metabolic Disorder and Vascular Aging, (8) Neuroscience and Brain Development, (9) Occupational and Environmental Laboratory, (10) Stem Cell and Tissue Engineering, and (11) Sports and Exercise Studies Research Centers. Likewise, the education cluster was formed with reference to the need to support high-quality medical education, consisting of (1) Medical Education Center, (2) Simulation Based Education and Research, (3) Center of e-Learning, (4) Health and Medicine Museum, and (5) Digital Library and Knowledge Management Center. Lastly, the core facilities consist of (1) Animal Research Facilities, (2) Molecular Biology and Proteomics Facilities, (3) Bioinformatics, (4) Clinical Research Supporting Unit, and (5) Writing Center.

1.2 Vision and mission

IMERI's vision is to create better healthcare and quality of life through disruptive innovation in medical education and research. In order to achieve this vision, IMERI's missions are (1) to discover novel ways to diagnose, treat and prevent diseases, (2) to bring such innovation from the laboratory benches to the clinics and market place, and (3) to provide novel ways and technologies to enhance the education of future doctors and other health professionals in order to build and sustain Indonesia's educational and research capacities.

1.3 Main activity

IMERI conducts convergent researches in medical education and biomedical sciences with a thematic research strategy. Researches conducted in IMERI possess thematic, problem-based approaches to address complex problems in medical education, health, and disease that are highly relevant to Indonesian society, through the formation of multidisciplinary groups of scientists. The primary themes of research conducted in the medical education clusters of IMERI include (1) technology-enhanced teaching and learning method, (2) faculty development and professionalism, and (3) inter-professional education and collaborative practice, whereas the primary themes of research conducted in the medical science clusters of IMERI include (1) Tropical Urban Living: growing up and growing old healthy, and (2) emerging and re-emerging infections in the Indonesian archipelago.

1.4 Organizational structure

IMERI is led by a Board of Directors that is responsible for IMERI as a whole medical education and institute within the framework of FKUI. Science activities in IMERI are supported by a Scientific Advisory Board which consists of national and international senior scientists from different fields of science, such as medical, educational, and associated technical sciences. Aside from the Scientific Advisory Board, IMERI's activities are supported by the University of Indonesia and Oxford Clinical Research Laboratory (IOCRL), Center for Clinical Epidemiology and Evidence-Based Medicine (CEEBM), *Pusat Riset Virologi dan Kanker Patobiologi* (PRVKP), and Indonesian Hydration Working Group (IHWG). Comprehensive core facilities and heads of clusters with extensive experiences aid in IMERI's operation through three departments, namely medical science and innovation, medical education, and institute development. The clusters are handled by groups of researchers from various departments of FKUI.

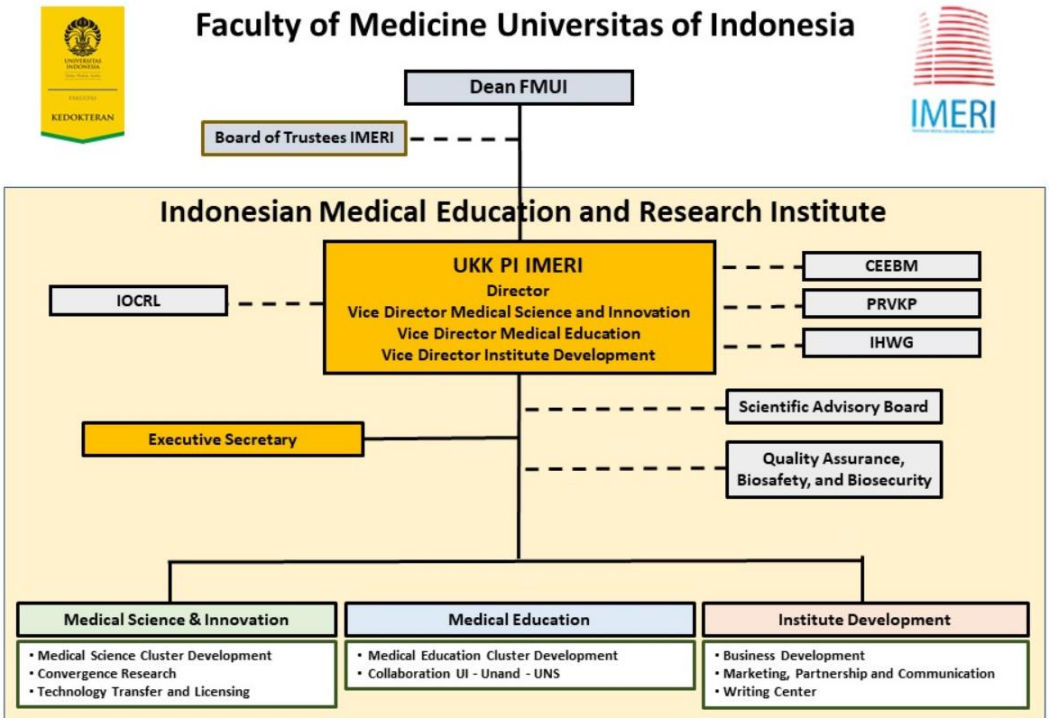

Figure 1. Organizational structure of IMERI FKUI

(Indonesia Medical Education and Research Institute, n.d.)

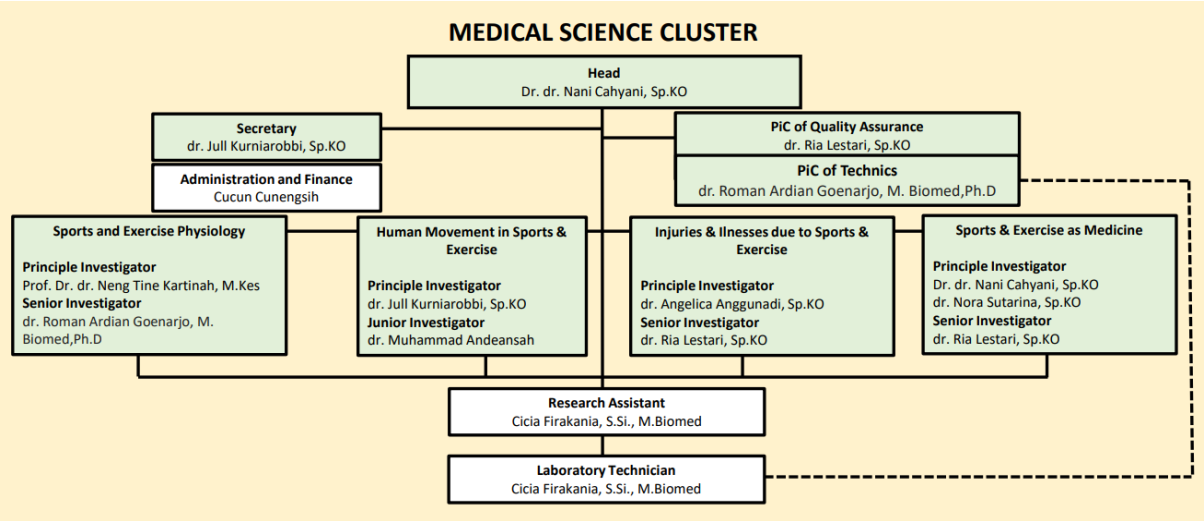

Figure 2. Organizational structure of Center for Sports and Exercise Studies

(Indonesia Medical Education and Research Institute, n.d.)

1.5 Department

Center for Sports and Exercise Studies Cluster is one of IMERI's medical science research cluster. The cluster focuses on health and medical profile, exercise and sports, and effect and problems of physical activity through medical and interdisciplinary sports and exercise research. In this regard,

the cluster conducts researches to enhance the production of good athletes and to promote the nationwide application of active lifestyle. Researchers in the cluster have a background from the Sports Medicine Specialist Program of FKUI. In order to support exercise studies in the cluster, a physical exercise clinic called Exercise Center is facilitated in the IMERI Building. Service in the Exercise Center is provided by Sports Medicine Specialists through physical exercise programs based on client's/patient's health condition (tailor-made) and treatment of health problems (e.g., obesity/overweight, coronary heart disease, type 2 diabetes mellitus, hypertension, blood lipid profile disorders, osteoporosis, osteoarthritis, and others) (Tobing, 2019).

CHAPTER 2: INTERNSHIP ACTIVITIES

2.1 Working conditions

The 4-months research internship was conducted at Exercise Center IMERI FKUI, a physical exercise clinic located at the SKY floor of IMERI Building, Salemba, Central Jakarta. The scientific writing process was done at Center for Sports and Exercise Studies Cluster, at the 6th floor of IMERI Building. The internship working hours at the cluster office was from 8 AM to 4 PM on weekdays, following the regular staff working hours. On-site working was optional on Wednesdays due to the Sports Medicine Specialist Program regular scientific study schedule. Every two weeks on Mondays, a cluster biweekly meeting is conducted on-site.

2.2 Internship project

The internship research project assigned aimed to analyze the energy balance, body composition, and physical activity level of adult obese patients at Exercise Center IMERI FKUI. The study was conducted from August to November 2022. The figure below exhibits the internship research project daily activities.

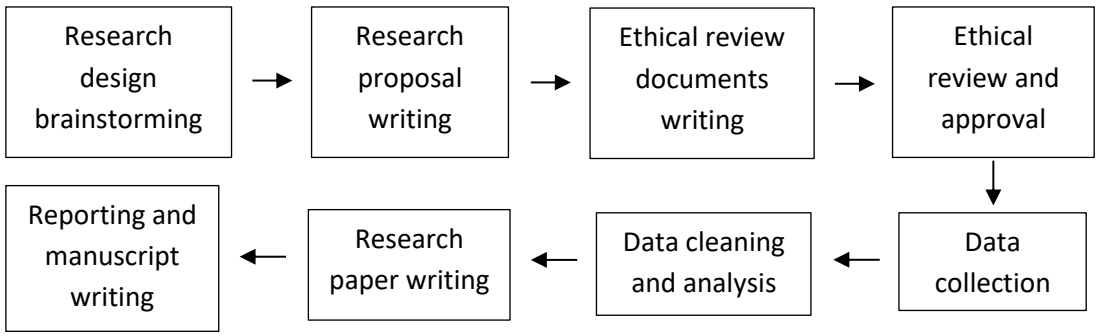

Figure 3. Internship research project

2.2.1 Daily activities

a) Introduction to the research cluster

On the first day of the internship, the author was introduced to the staffs, medical doctors, and health research facilities at the research cluster.

b) Working timeline and study design discussion

On the first day of the internship, the author was assigned the internship working timeline from August to November 2022. Subsequently, the internship supervisor and the author

discussed the research design. The scientific discussions and critical thinking were considered as enjoyable experiences.

c) Research proposal outline and scientific journal reading

After the research design was settled, the research proposal outline writing and scientific journal reading followed along. This process allowed the author to learn how to construct a research project from the beginning.

d) Research proposal writing

The research proposal writing progress went by for four weeks. The author's literature review and scientific writing skills were essentially utilized and developed during this process. Theories obtained from literature reviews were notably beneficial in adding knowledge for the author. During the writing period, the author was also introduced to the utilization of EndNote, a commercial reference management software to manage bibliographies and references.

e) Ethical review documents

The ethical review documents were prepared and submitted to the ethics committee of FKUI-RSCM. This process allowed the author to learn how to appropriately construct ethical review documents before proceeding to data collection process in health sciences research.

f) Data collection

Data collection process was done at Exercise Center IMERI FKUI. Throughout this process, the author learned to push herself and approach the study subjects independently to ask for their consent to participate in the study.

g) Data cleaning

Data cleaning process was done through data input re-checking using Microsoft Excel 2021.

h) Data analysis

Data analysis process was done using Microsoft Excel 2021.

i) Research paper writing (results, discussion, conclusion, and recommendation)

Research paper writing was done after the data collection, data cleaning, and data analysis processes were done.

j) Reporting (presentation)

The results obtained from the research internship process was presented during the cluster biweekly meeting. During this session, the author received a number of

constructive feedbacks from the researchers on how to improve the discussion section and future research.

k) Publication preparation

Cover letter and manuscript for scientific publication was prepared according to the requirements from the suitable journal.

2.2.2 Theory and practice comparison

Some of the theoretical foundations of nutrition science were firstly introduced to the author at i3L, and these theories were implemented during the internship, particularly for the data collection procedure in practice. The concept of energy expenditure (EE) was firstly introduced to the author in the Human Nutrition course. Bioelectrical impedance analysis (BIA), dietary assessment, and the International Physical Activity Questionnaire (IPAQ) were the three methods utilized to collect data for the internship research project, and the author learned about these methods in the Human Nutrition Laboratory course. At the cluster, the bioelectrical impedance analysis instrument is connected to a software in a computer, thus allowing the measurement result to be directly printed for both the examiner and the patient. Dietary assessment was performed through digital method using a calorie counter application originated in the United States, MyFitnessPal. Lastly, the short version of IPAQ (IPAQ-SF) was utilized to estimate patients' level of physical activity and energy expenditure.

2.2.3 Difficulties encountered and how to overcome them

a) Writing in Bahasa Indonesia

Having three years studying at i3L fully in English, writing in Bahasa Indonesia was undoubtedly challenging for the author. However, over time, the author managed to adapt and adjust in writing using Bahasa Indonesia to comply with the institution's writing policy.

b) Ethical review process took a longer than expected

The ethical review process took a longer time compared to the initial predicted duration, thus slightly shifting the initial working timeline. However, the author managed to continue the working progress to comply with the assigned timeline.

c) Independent data collection process

During the data collection process, a challenge encountered by the author was approaching the patients independently to ask for their participation in the study as a

first-time experience. However, the author managed to proceed with the process and approached all of the patients that can be included as the study subject.

2.3 Complementary activities

a) Conducted Sports Medicine self-learning

While waiting for the ethical approval, Sports Medicine self-learning was conducted by reading Sports Medicine textbooks for several days. Some of the topics learned include physical activity and fitness terminologies, health- and skill-related physical fitness components, and preparticipation physical evaluation.

b) Administered to preparticipation physical evaluation and personalized exercise training at the Exercise Center

The author was given the chance to be trained by the Sports Medicine Residents at the Exercise Center for a total of 8 training sessions. Prior to the training program, the author experienced health and fitness assessment performed by the Sports Medicine Residents as well.

c) Attended monthly research and innovation meeting by IMERI

During the internship period, the author also participated in the institution's monthly research and innovation meeting conducted online via Zoom for a total of 8 meetings. Completed and/or ongoing research projects were presented and discussed typically in the research meetings, while brainstorming for new innovative ideas in biomedical research were done in the innovation meetings. Each research cluster and facility at IMERI present their respective working programs alternatively.

d) Attended Sports Medicine Residents orientation event

Annually, like other residency programs for medical specialists, the Sports Medicine Residency Program of FKUI welcomes the new residents to join the study program. The author as a research intern, was invited to participate in the event on 14th of August, 2022.

e) Attended literature search training from FKUI library

A literature search training was provided by the FKUI library facility in order to enhance the residents' research skills and knowledge. The author was given the opportunity to learn how to utilize free resources to obtain scientific literatures such as PubMed.gov.

f) Attended guest lectures to commemorate the National Sports Day and National Health Day of Indonesia

On the 9th of September 2022, the author attended a guest lecture conducted by the Sports Medicine Residency Program in order to commemorate the National Sports Day of

the year 2022. The topic elaborated by the guest lecturers was “The Role of Sports Medicine Specialist in Maintaining the Health of Athletes”. On the 18th of November 2022, the author also attended another guest lecture to commemorate the National Health Day of the year 2022. The topic elaborated by the guest lecturers was “The Effect of Physical Inactivity to the Health of Children to Geriatric Population: A Pandemic Threat”.

CHAPTER 3: PROJECT DESCRIPTION

3.1 Introduction

Obesity is one of the global health problems which remarkably affects developing countries (Rachmi *et al*., 2017; Harbuwono *et al*., 2018). Indonesia as a developing country is still faced with obesity as one of the main problems. Based on data from the National Health Survey of the Republic of Indonesia (RISKESDAS) in 2018, the prevalence of adults aged above 18 years with body mass index (BMI) of ≥25 to <27 kg/m^2 (indicating overweight) and BMI of ≥27 kg/m^2 (indicating obesity) in Jakarta province was 15.6% and 29.8%, respectively (Ministry of Health of the Republic of Indonesia, 2019). According to Sudargo *et al*. (2018), East Kalimantan, North Sulawesi, North Maluku, Gorontalo, and Jakarta are the five provinces with the highest prevalence of general obesity in Indonesia.

Obesity is described as a chronic disease, implying that it does not occur only once in a while, but rather as a consequence of an individual's long-term life course (Blüher, 2019; Sudargo *et al*., 2018). Numerous studies have reported that obesity is linked to reduced quality of life and life expectancy due to its association with increased risk of non-communicable diseases, such as stroke, hypertension, type 2 diabetes mellitus, coronary heart disease, metabolic syndrome, asthma, and several types of cancer (Blüher, 2019; Chourdakis, 2020; Dhawan & Sharma, 2020; Nyberg *et al*., 2018; Rippe & Foreyt, 2021). Health problems caused by obesity occur through disturbances in metabolism and various organs of the body (Boubertakh *et al*., 2022; Fruh, 2017; Rippe & Foreyt, 2021). This phenomenon may possibly result in the onset of other disorders. Obesity is also associated with various comorbidities in the body systems, including cardiovascular, gastrointestinal, musculoskeletal, metabolic, neurological, skin, reproductive, and other comorbidities (Fruh, 2017; Panuganti *et al*., 2022).

The occurrence of obesity is attributed to complex determining factors (Dewi *et al*., 2020). These factors include demographic characteristics (such as age and gender), lifestyle, food intake, environmental characteristics, physical activity, genetic factors, socioeconomic status, urbanization, food security, psychological factors, smoking behavior, alcohol consumption, and nervous system disorders (Sudargo *et al*., 2018; Sudikno *et al*., 2020). Among the various factors that can cause obesity, energy balance and lifestyle play a very important role (Rippe & Foreyt, 2021).

One of the main aspects of lifestyle is energy intake from food and drink. Obesity is generally regarded as an energy balance disorder (Ludwig *et al*., 2021). In this regard, positive energy balance occurs when an individual consumes more energy than he or she expends for activities (Sudargo *et al*., 2018). Therefore, the basic view of treating obesity is control over energy balance through minimizing energy intake and increasing energy expenditure.

Aside from energy intake, another important aspect of daily life is physical activity (Park *et al*., 2020). A large body of literature have revealed that physically active people possess a lower risk of gaining weight and being overweight, as well as obesity (Rippe & Foreyt, 2021; Sudargo *et al*., 2018; World Health Organization, 2020). A number of recent studies have also shown that daily life behaviors such as increased sedentary behavior, decreased physical activity, and reduced sleep lead to excessive food consumption, especially refined fats and carbohydrates (Rippe & Foreyt, 2021). It has been well established that switching sedentary behavior for physical activity of varying intensities offers health benefits. WHO recommends adults aged 18–64 years to do at least 150–300 minutes of moderate-intensity aerobic physical activity per week or at least 75–150 minutes of high-intensity aerobic physical activity per week (World Health Organization, 2020).

In 2020, 33.5% of the Indonesian population has low physical activity, an increase compared to 2013 with a proportion of only 26.1% (Dewi *et al*., 2020). Several factors that may influence physical activity level in Indonesia are economic development, rapid urbanization, and technological advances (especially in the field of transportation), which may create an environment for sedentary behavior and relatively low physical activity (Arsyad *et al*., 2022). In the health sector, many efforts to reduce overweight and obesity in adults have been focused on treatment through weight loss. The desired target for obese patients is weight reduction through decreasing fat mass concurrently with maintaining or increasing fat–free mass. This is primarily due to fat–free mass being a significant determinant of basal energy expenditure, maintenance of metabolism, and overall health (Ludwig *et al*., 2021). Likewise, it is also of notable importance to consider effective approaches in the prevention of excess weight gain through increasing physical activity (Rippe & Foreyt, 2021).

Alike other types of occupation, healthcare workers are also affected by obesity although they should be role models who contribute to the increase in awareness of obesity prevention and behavioral change towards a healthy lifestyle amongst the community (Kunyahamu *et al*., 2021). Obesity among healthcare workers (e.g., doctors) is a significant issue since it can influence both their health condition and professional capability and/or credibility in advising patients, particularly concerning lifestyle modification (Puhl *et al*., 2013).

This study aimed to analyze the energy balance (i.e., energy intake and energy expenditure), body composition, and physical activity level of adult obese patients at Exercise Center IMERI FKUI. A majority of the patients at the Exercise Center are academics of FKUI (e.g., medical doctors, residents, medical students, educational staff, and employees) with limited physical activity (i.e., sedentary behavior) as a result of the demands of daily occupational duration.

3.2 Study design

The internship research project was a cross-sectional study involving 12 participants (8 men and 4 women) with BMI of ≥25 kg/m^2 enrolled as patients at Exercise Center IMERI FKUI. Total sampling was the sampling technique utilized in the study. Participants were approached directly before their scheduled training sessions at the Exercise Center and all of them provided written informed consent prior to participating in the study. The data collection procedure was designed to be conducted for 7 consecutive days. On Day 1, participants were asked for their respective informed consent to participate in the study, had their respective body composition measured, and were trained on how to utilize the MyFitnessPal (MFP) application for dietary assessment starting from Day 1. From Day 1 to Day 7, participants reported their daily calorie record to the researcher. Lastly, on Day 7, participants were asked to fill out IPAQ-SF administered through an online form.

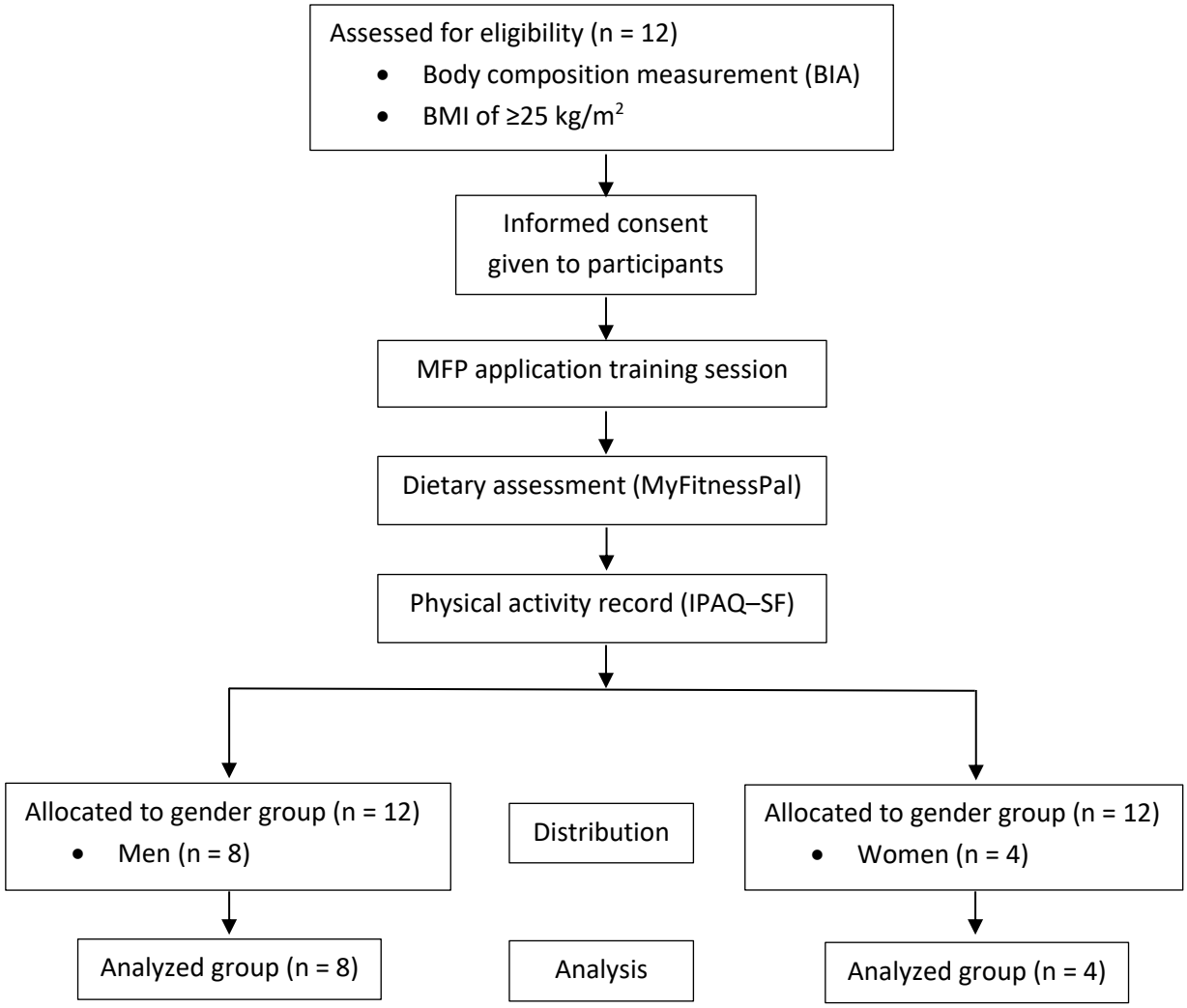

Figure 4. Internship research project study design

3.3 Methodology

3.3.1 Participant recruitment

In order to participate in this study, the possible study participants were assessed for their eligibility. The participants should be academics at University of Indonesia and enrolled as patients at the Exercise Center. The patients were also screened for obesity status based on body mass index (BMI) data obtained from BIA measurements. The BMI inclusion criteria of ≥25 kg/m^2 (i.e., obesity) was adopted from the World Health Organization (WHO) BMI categorization for the Asia-Pacific category, namely underweight (<18.5 kg/m^2), normal weight (18.5–22.9 kg/m^2), overweight (23–24.9 kg/m^2), and obese (≥25 kg/m^2) (Lim *et al.*, 2017).

3.3.2 Body composition measurement

The body composition analyzer utilized was launched by TANITA. Aside from BMI, the patients' body composition components (weight, height, BMI, BMR, fat mass, fat percentage, and muscle mass) were also recorded using the BIA instrument. The measurements were performed by firstly entering individual data such as weight, height, age, gender, and clothing weight to the BIA instrument. Subsequently, a pair of electrodes (with voltage sensors) was attached to the wrists and ankles of the patients, so that an impedance of an electric current can pass through the body. The computer connected to the BIA instrument will then display the estimated results of the patients' body composition components.

3.3.3 Dietary assessment

Estimates of total daily energy intake (EI) were obtained from food and beverage calorie data inputted into MFP. Prior to the data inputting, patients received a training session on how to utilize MFP for calorie tracking and serving size estimation from the researcher. When the food or beverage item was not available in the database, participants were permitted to input them in Bahasa Indonesia instead. Subsequently, patients recorded their estimated food record and serving size (i.e., breakfast, lunch, dinner, and snack intake) into MFP using the food record and serving size estimation feature provided and reported their daily calorie intake to the researcher every day for 7 consecutive days. The data obtained was in the form of kilocalories (kcal), and was then processed to generate the average EI as a component for the determination of energy balance.

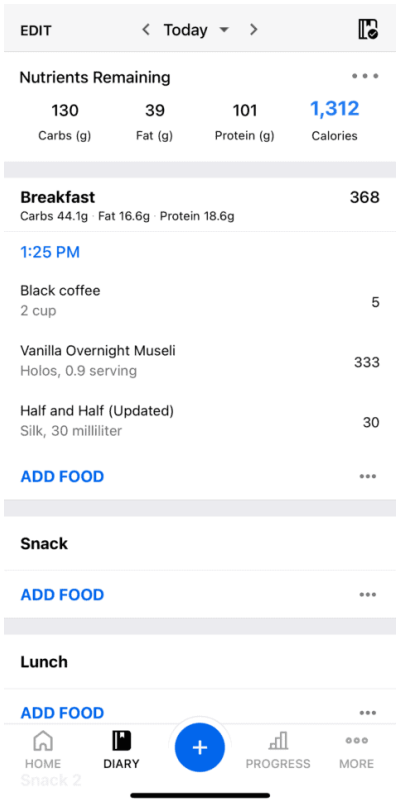

Figure 5. Display of MyFitnessPal calorie tracker

3.3.4 Physical activity record

The patients were asked to fill out IPAQ-SF administered through an online form in order to obtain their respective physical activity level and estimates of energy expenditure from the past 7 days (Di Blasio *et al*., 2016). IPAQ-SF is a questionnaire designed to assess physical activity over the past 7 days or during a "typical week", and can be done either via telephone interview or independently (Craig *et al*., 2003; Fogelholm *et al*., 2006). IPAQ-SF consists of seven questions regarding the physical activity of an individual aged 15-69 over the past 7 days. The data obtained was then processed using the IPAQ scoring protocol together with the IPAQ automated report to generate physical activity data. IPAQ measures performance in MET. These MET values are then multiplied by the physical activity intensity in minutes and days to be summed up, which in turn results in determining the overall physical activity score (Oyeyemi *et al*., 2011). In this study, the patients' physical activity score obtained in MET-minutes/week was converted to kcal-minutes/week using an automatic report of IPAQ–SF generated by Di Blasio *et al*. (2016) to generate NEAT and EAT as components of EE. This automatic report also provided the overall physical activity level of patients. The average physical activity level data obtained was categorized into low, moderate, and high.

3.3.5 Energy balance determination

The method of this study was based on the energy balance concept, where the amount of energy intake and the amount of each component of energy expenditure (i.e., basal metabolic rate (BMR), non-exercise activity thermogenesis (NEAT), exercise activity thermogenesis (EAT), and thermic effect of food (TEF) were estimated. Dietary assessment to estimate energy intake was done through a digital method, namely using MFP (Cade, 2017). BMR as the major component of energy expenditure was obtained from BIA measurements (Trexler *et al*., 2014). NEAT and EAT data was obtained from the utilization of IPAQ-SF, to represent the categorization of physical activity (von Loeffelholz & Birkenfeld, 2000). Lastly, TEF data was represented by adding 10% of the sum of BMR, NEAT, and EAT to obtain the total daily energy expenditure (TDEE) estimates (Cole, 2019).

Energy balance was determined by subtracting EE from EI. EI was obtained by calculating the average calorie intake data reported by the participants for 7 consecutive days. On the other hand, EE of each participant was obtained by summing up the components of energy expenditure (i.e., BMR, TEF, NEAT, and EAT) based on the method highlighted by Cole (2019). BMR data (in kcal/day) was obtained from BIA measurements, NEAT and EAT data was obtained through the conversion of physical activity score in MET-minutes/week to kcal-minutes/week from IPAQ-SF (and then converted to kcal/day), and TEF data (in kcal/day) was calculated by adding 10% of the sum of BMR, NEAT, and EAT. Subsequently, the average EE of the participants was calculated.

An additional calculation of participants' BMR data using a manual predictive equation developed by Mifflin-St. Jeor *et al*. (1990) was done to provide a comparison to the average BMR data generated from the BIA measurement. Mifflin-St. Jeor *et al*. (1990) developed the predictive equations to estimate BMR as follows: BMR = (9.99 × weight) + (6.25 × height) – (4.92 × age) + 5 for adult men aged 19-78 years, and BMR = (9.99 × weight) + (6.25 × height) – (4.92 × age) – 161 for adult women aged 19-78 years.

3.3.6 Data analysis

The data cleaning process was done through data input rechecking. All of the analyzed data was then presented in tables and figures to exhibit the description of mean, standard deviation (SD), frequency, and percentage of each variable (i.e., body composition measurements, energy balance, and physical activity level) measured in each participant using Microsoft Excel 2021.

3.4 Results

A total of 12 adult participants (aged ≥18 years old), namely 8 men and 4 women with BMI ≥25 kg/m^2 (indicating obesity), took part in this study. The basic characteristics and the average body composition data of participants in this study (i.e., gender and age) are presented in **Table 1**. Out of a total of 8 men, 4 (33.33%) of them are categorized as early adults, while 4 (33.33%) of them are categorized as late adults. On the other hand, 4 (33.33%) women who participated in this study are all categorized as late adults.

Table 1. Distribution of participants' basic characteristics and average body composition components

Variable (Distribution)	Unit	Male [n = 8 (66.67%)]	Female [n = 4 (33.33%)]
Age 20-39 (early adult)	years	4 (33.33%)	0
Age 40-59 (late adult)	years	4 (33.33%)	4 (33.33%)
Body weight	kg	85.43 ± 8.58	63.68 ± 4.64
Body height	m	1.67 ± 0.04	1.55 ± 0.07
BMI	kg/m^2	30.78 ± 2.8	26.53 ± 0.82
BMR	kcal/day	1725.25 ± 120.12	1199 ± 96.27
Fat mass	kg	25.16 ± 6.92	24.08 ± 1.56
Body fat percentage	%	29.03 ± 5.71	37.8 ± 1.16
Muscle mass	kg	57.15 ± 3.19	37.28 ± 2.97

Data is presented in mean ± standard deviation (SD)

The daily average energy intake data of participants in this study is presented in **Table 2**. Out of a total of 8 men, the mean energy intake reported was 1993.52 ± 310.15 kcal/day, while out of a total of 4 women, the mean energy intake reported was 1191.39 ± 210.55 kcal/day.

Table 2. Distribution of participants' daily average energy intake

Gender	n	Daily energy intake (kcal/day)
Male	8	1993.52 ± 310.15
Female	4	1191.39 ± 210.55

Data is presented in mean ± standard deviation (SD)

The physical activity level data of participants in this study is presented in **Figure 6**. It was found that 1 (8.33%) man had a low physical activity level, 2 (16.67%) women and 4 (33.33%) men had a moderate physical activity level, and 2 (16.67%) women and 3 (25%) men had a high physical activity level during the 7-day period of data collection.

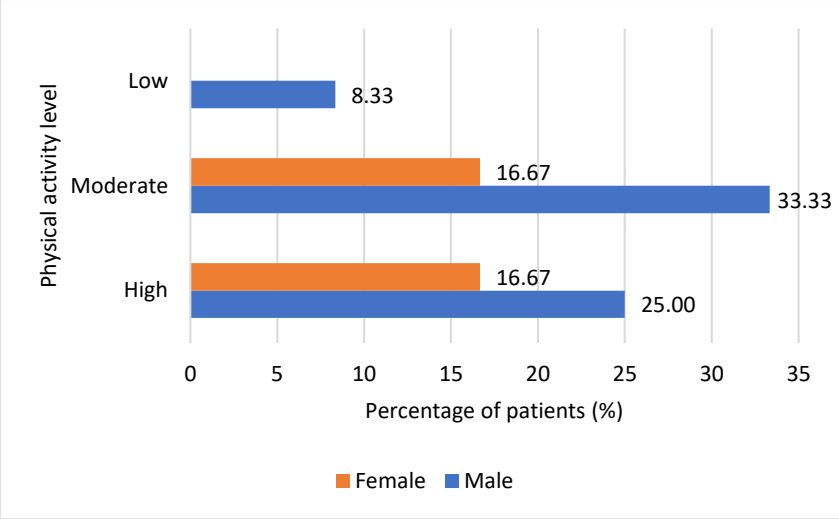

Figure 6. Distribution of participants' physical activity level

The daily average energy expenditure (factorial estimate) data of participants in this study is presented in **Table 3**.

Table 3. Distribution of participants' daily average energy expenditure (factorial estimate of TDEE)

Gender	n	BMR (kcal/day)	NEAT + EAT (kcal/day)	TEF (kcal/day)	TDEE (kcal/day)
Male	8	1725.25 ± 120.12	384.33 ± 162.44	210.96 ± 17.83	2320.54 ± 196.12
Female	4	1199 ± 96.27	495.06 ± 163.16	169.41 ± 22.75	1863.46 ± 250.28

Data is presented in mean ± standard deviation (SD)

In regard to the BMR data, the BIA instrument utilized automatically calculated BMR with medically validated equations. The average BMR obtained from BIA measurements of participants was 1725.25 ± 120.12 kcal/day for men and 1199 ± 96.27 kcal/day for women. The average NEAT and EAT obtained from IPAQ-SF conversion was 384.33 ± 162.44 kcal/day for men and 495.06 ± 163.16 kcal/day for women. The average TEF calculated was 210.96 ± 17.83 kcal/day for men and 169.41 ± 22.75 kcal/day for women. Ultimately, the average sum of the aforementioned data yielded a TDEE estimation of 2320.54 ± 196.12 kcal/day for men and 1863.46 ± 250.28 kcal/day for women. An additional calculation of participants' BMR data using a manual predictive equation developed by Mifflin-St. Jeor *et al*. (1990) is presented in **Table 4**.

Table 4. Distribution of participants' average BMR data

Gender	n	**BMR (kcal/day)** - BIA	**BMR (kcal/day)** - Mifflin-St. Jeor
Male	8	1725.25 ± 120.12	1725.98 ± 113.58
Female	4	1199 ± 96.27	1226.45 ± 93.44

Data is presented in mean ± standard deviation (SD)

The distribution of participants' energy expenditure components relative to the estimated TDEE (%) is illustrated in **Figure 7**, whereas the energy balance (i.e., energy intake and energy expenditure) data of participants in this study is exhibited in **Figure 8a** and **Figure 8b**, respectively.

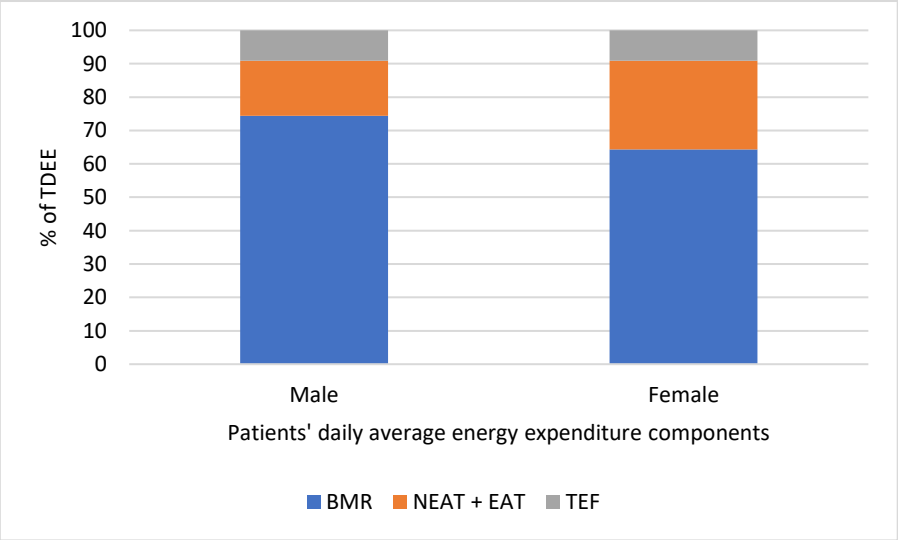

Figure 7. Distribution of participants' daily average energy expenditure components

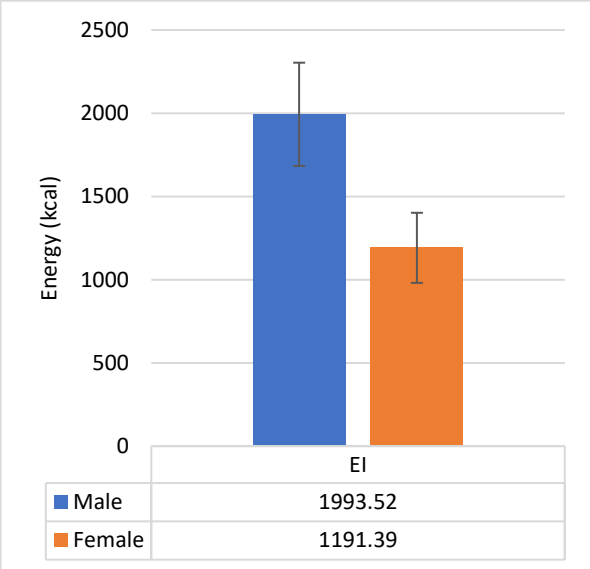

Figure 8a. Distribution of participants' energy intake (EI)

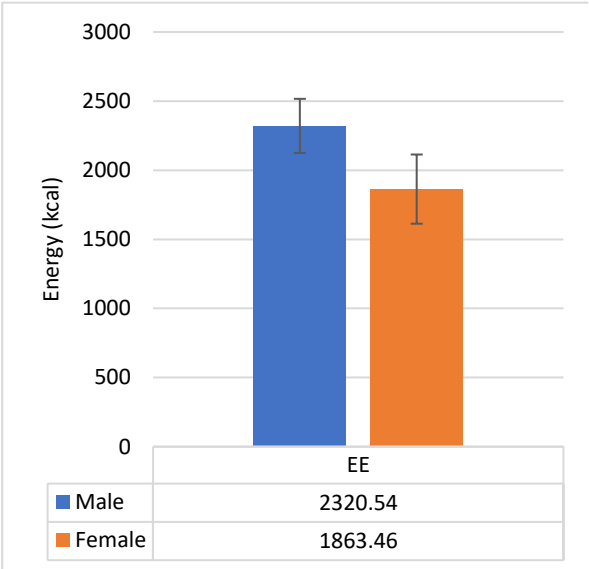

Figure 8b. Distribution of participants' energy expenditure (EE)

3.5 Discussion

3.5.1 Description of participants' demographic characteristics

This study revealed that the proportion of obesity is higher in late adult patients (aged 40-59 years) as many as 8 (66.67%) patients compared to early adult patients (aged 20-39 years) as many as 4 (33.33%) patients. This finding on participants' difference in age and proportion of obesity is in agreement with the findings of a study by Septiyanti & Seniwati (2020), who reported that obesity and central obesity generally increase with age. They suggested that there are a lot of physiological and body composition changes that occur as a person ages. Supporting this suggestion, Canning *et al*. (2014) in Septiyanti & Seniwati (2020) stated that an individual's body weight increases throughout the life span until around the age of 60 and then tends to decrease thereafter.

In terms of gender differences, obesity is generally more common in women compared to men (Cooper *et al*., 2021; Harbuwono *et al*., 2018; Kapoor *et al*., 2021). Nurwanti *et al*. (2018) revealed that women possess a higher risk of obesity compared to men although they consume refined carbohydrates or fatty fried foods with the same amount and frequency. This is attributed to the differences in hormone regulation between men and women, particularly in the regulation of energy intake and energy expenditure, such as the interaction between estrogen, leptin, and thyroid hormone in women (Pantaleão *et al*., 2010). Energy expenditure in women is indeed lower than that of men, so this causes the tendency of overall fat storage to be higher in women (Geary & Lovejoy, 2007). However, in several studies, sex differences regarding the relationship between eating habits and obesity have been reported to be inconsistent. This is primarily due to a variety of factors involved in the determination of an individual's body weight and body composition, namely environment, metabolism, lifestyle, genetics, hormone performance, behavior, and culture (Brunani *et al*., 2021; Holmes & Racette, 2021; Nurwanti *et al*., 2018; Power & Schulkin, 2008; Varghese *et al*., 2017).

Men and women have differences in the proportion of body fat, the pattern of fat accumulation and mobilization, the utilization of body fat as metabolic fuel, as well as the consequences of excess and deficiency of fat storage in the body (Power & Schulkin, 2008). This difference origins from differences in metabolism and hormones between men and women at birth, thus providing differences in the health risks that cause obesity.

3.5.2 Description of participants' body composition

The average BMI of men and women with obesity at the Exercise Center were 30.78 ± 2.8 kg/m^2 and 26.53 ± 0.82 kg/m^2, respectively. According to the Asia-Pacific category, a BMI of ≥25 kg/m^2 is categorized as obesity. In regard to body composition, Power & Schulkin (2008) highlighted that women have larger stores of adipose tissue than men, and this is true for all races and cultures. This

is in agreement with Cooper *et al*. (2021) and Varghese *et al*. (2017) who reported that although obesity is a heterogeneous condition, it is more common in women than men. Correspondingly, the findings of this study exhibited that in comparison with men, women had higher body fat mass and body fat percentage relative to their average body weight; amounting to body fat mass of 24.08 kg (37.8%) for women and 25.16 kg (29.03%) for men relative to an average body weight of 63.68 kg for women and 85.43 kg for men. Another component of body composition highlighted in this study was participants' body muscle mass. The average body muscle mass recorded in this study was 57.15 kg for men and 37.28 kg for women. Out of 12 participants, 11 (91.67%) participants were found with less muscle mass. The age-related loss of physical performance or muscle mass and strength is termed as sarcopenia. Sarcopenia is often accompanied by an increase in the amount of adipose tissue, and this condition is called sarcopenic obesity (Roh & Choi, 2020). The etiology of age-related physiological changes in body composition is so far complex and poorly understood. However, lifestyle, metabolic disorders, and negative hormonal changes are indeed factors associated with sarcopenia. Lutski *et al*. (2020) reported that sarcopenia and obesity share a lot of common pathological mechanisms, including insulin resistance and low-grade chronic inflammation. In this regard, excess fat mass may indeed induce inflammation that contributes to the development of sarcopenia (Gregor & Hotamisligil, 2011).

3.5.3 Description of participants' physical activity level

This study revealed that a majority of the participants had a moderate to high physical activity levels. The results obtained in this study are different compared to the general description of obesity, in which a lack of physical activity has been described as one of the most important risk factors for obesity. This may have occurred because obesity is described as a condition that occurs due to a lack of physical activity and excess energy intake in the long term, while the data collection procedure and observation in this study only lasted for 7 consecutive days.

The difference in results found in this study may also be attributed to the lack of accuracy of IPAQ-SF to estimate the physical activity level and energy expenditure reported by participants (self-reporting). Lee *et al*. (2011) suggested that most validation studies on IPAQ-SF only have a small correlation with the objective measures of activity achieved. Therefore, the utilization and interpretation of IPAQ-SF is recommended to be handled with caution, both in relative and absolute terms (Grimm *et al*., 2012; Lee *et al*., 2011). Accordingly, Grimm *et al*. (2012) and Wanner *et al*. (2016) also revealed that the utilization of IPAQ caused overreporting of physical activity and underreporting of sitting time.

3.5.4 Description of participants' energy balance (EI and EE)

The main result of this study is the description of participants' energy balance, a comparison between participants' reported energy intake and energy expenditure. As described above, the mean EI reported and estimated was 1993.52 ± 310.15 kcal/day for men and 1191.39 ± 210.55 kcal/day for women. On the other hand, the mean EE reported and estimated was 2320.54 ± 196.12 kcal/day for men and 1863.46 ± 250.28 kcal/day for women.

Based on the EI and EE findings, 11 (91.67%) participants were observed to have a negative energy balance, while 1 (8.33%) participant was observed to have a positive energy balance during the 7-day period of data collection. This result is in reverse compared to the general description of obesity, in which the amount of energy intake is greater than that of energy expenditure. In this study, the greater amount of energy expenditure acquired was largely attributed to the limitation of the results obtained in the form of estimation, based on the factorial estimation of TDEE method implemented. In this case, self-reporting of the amount of energy intake using MFP and energy expenditure using IPAQ-SF by obese patients certainly affected the accuracy of the results obtained (Cole, 2019).

One of the main features offered by MFP is the ability to log food intake (Elfhag & Rössner, 2005). Users can utilize MFP to log any food item that has an associated calorie count from the MFP's food database. Tosi *et al*. (2021) stated that MFP has a diverse food database, not only database of western food items but also local food items from Indonesia and from Taiwan. They revealed that the absence of a country-specific food composition database could be a barrier in measuring energy and nutrient intake. Likewise, McCaig *et al*. (2020) argued that the estimated calorie content of food and beverages on MFP was considered inaccurate, with a tendency to provide reduced calorie content, differences in data estimates for the same food items, and mismatch of information on food and beverage packaging stated on the application. This inaccuracy appears to occur because anyone can enter calorie data for a food or beverage item in the MFP public database.

Didžiokaitė *et al*. (2018) suggested that the timing of food intake record should be one of the main factors to be taken into account when using MFP. In this study, no specific time was specified to administer the food intake record to the application. Thus, participants can decide to enter their calorie intake data before, during, or after eating and drinking. The time for recording calorie intake can vary for each individual because it is related to each individual's routine, and therefore it may influence eating habits, recording accuracy, portion measurement, and commitment to diet control.

MFP users can be categorized into two categories, namely users who are not very motivated to record their food and do not record everything consumed (i.e., not committed), and users who are motivated to record what is consumed (committed) (Bracken & Waite, 2020; Gordon *et al*., 2019).

Recording food and beverage consumption for calorie estimation may be very time consuming amidst an individual's schedule. Thus, research participants often record their calorie intake during breaks at work or at the end of the day (e.g., after work and dinner) when more free time is available (Didžiokaitė *et al*., 2018). In addition, excess calories can also be manipulated out of existence by not entering data into MFP (Chen *et al*., 2019; Tosi *et al*., 2021). These may be some of the underlying reasons of why the reported calorie intake was much lower than that included in this study.

In regard to the BMR (i.e., a component of energy expenditure) data generated from BIA measurement based on medically validated predictive equations, a comparison of calculation can be made using another predictive equation as a manual method. A study by Krüger *et al*. (2015) indicated the Mifflin-St. Jeor equation (1990) as the most adequate predictive equation to estimate BMR in obese individuals, while the equations of Harris and Benedict, Schofield, FAO/WHO/UNU, and Henry and Rees were not as recommended because these equations may overestimate energy requirements. From the Mifflin-St. Jeor calculations, an average BMR of 1725.98 ± 113.58 kcal/day for men and 1226.45 ± 93.44 kcal/day for women was obtained as a predictive calculation to compare with the average BMR data generated from the BIA measurement. The average BMR data obtained from the BIA instrument and Mifflin-St. Jeor calculation was similar for men, while the average BMR data generated from the Mifflin-St. Jeor calculation was higher compared to the one obtained from the BIA instrument for women. This finding is in agreement with Cancello *et al*. (2018), who argued that even the Mifflin-St. Jeor equation does not precisely predict BMR–and it is suggested to plan diet intervention for obese patients by measuring rather than estimating BMR. However, notable differences in body composition measurement using predictive equations in comparison with BIA measurement in women and men subjects have been limited.

3.5.5 Strengths and limitations of the study

This internship research project was the first study to implement dietary assessment using a digital method (i.e., MFP) in a population of adult obese patients at Exercise Center IMERI FKUI. However, this study has a number of limitations. First of all, this study is a cross-sectional study, in which causal relationships among the variables observed cannot be deduced. In addition, there is a possibility that the participants may have altered their lifestyle practices due to the knowledge of being in an obese condition although these changes cannot be observed (i.e., because of the cross-sectional study design). Secondly, this study implements the use of a self-reporting method to collect data on energy intake and energy expenditure from physical activity which may give rise to bias, since this method largely depends on the enthusiasm, adherence, and memory of the participants. Thirdly, calculation of the number of calories included in the utilization of MFP in this study was also not

validated and thus may tend to induce underestimation or overestimation. Furthermore, MFP cannot generate macronutrient distribution in the free feature, and thus contributed to the limitation of discussion points for energy intake. Fourthly, although the researchers involved in this study managed to collect the overall data (e.g., energy intake, energy expenditure, body composition, and physical activity level) from a total of 12 adult obese patients, the relatively small sample size remains a limitation. Lastly, a longer period of observation on obesity as a result of chronic (i.e., long-term) positive energy balance becomes important for further research with a similar research interest since the observation in this study was only conducted for 7 days. Thus, similar studies conducted in this area could be conducted in other populations, with longer periods of observation, and preferably involving larger sample sizes.

3.6 Conclusion and recommendation

3.6.1 Conclusion

This study concludes several key takeaways regarding the description of energy balance, body composition, and physical activity level of adult obese patients at Exercise Center IMERI FKUI. Out of a total of 12 adult obese patients at the Exercise Center, it was found that 11 (91.67%) patients had a negative energy balance and 1 (8.33%) patient had a positive energy balance. The energy balance analysis was obtained from the EI and EE estimations. Regarding body composition, the average body weight, body height, BMI, body fat mass, body fat percentage, and body muscle mass data vary among men and women participants. Regarding physical activity level, a majority of participants reported a moderate to high physical activity level within 7 consecutive days of observation.

3.6.2 Recommendation

Based on the findings of this study, several recommendations that can be given to obese patients and healthcare workers. Several suggestions can also be deduced to improve further research. Given that the participants fell into the category of obesity based on their body composition measurements, they are suggested to alter their body composition (i.e., increasing muscle mass and decreasing fat mass) by maintaining their calorie intake deficit (i.e., negative energy balance) and physical activity level (i.e., moderate to high intensity). Concerning the use of MFP, it is recommended for patients to not use the application independently, but rather with guidance from a nutritionist or health worker in regards to weight management. Healthcare workers, especially sports medicine practitioners, are recommended to provide education and notable attention to patients with obesity to improve their body composition (i.e., increasing body muscle mass and reducing body fat mass) in line with the strength training program enrolled. In order to enhance further research with similar

research interest, a larger number of samples and a longer observation time would be desirable. Utilization of a more accurate method for calorie intake data entry and measurement of physical activity level would be suitable. This is due to the inability of MFP in the free feature to generate macronutrient distribution and due to the inaccuracy of IPAQ-SF to generate physical activity level and energy expenditure. Ultimately, comparison between the data on the number of exercise frequencies and the amount of energy expenditure obtained in this study and future research will make this research more meaningful.

CHAPTER 4: SELF-REFLECTION

4.1 New skills learned

From this internship experience, the author learned:

1. To maintain self-discipline, to build good relationships with colleagues at the office, to engage in the institution's regular events and meetings, to train public speaking skills through progress update in biweekly meetings, to enhance scientific discussions and critical thinking, as well as to work in compliance with the assigned working timeline.
2. To maintain personal time management, diligence, and networking skills.
3. To propose health research appropriately from the beginning of research design brainstorming, research proposal outline writing, scientific journal reading, utilization of reference management software (i.e., EndNote), research proposal writing, ethical review documents preparation, data collection, data cleaning, data analysis, research paper writing, reporting, until the last step of publication preparation.

4.2 Strengths and weaknesses

Several strengths identified throughout the author's internship experience:

1. Managed to complete all of the assigned tasks in compliance with the assigned timeline.
2. Learned to apply the theoretical foundations of nutrition science introduced at i3L in real-life research successfully.
3. Maintained i3L's core values throughout the internship period.
4. Built good relationships and communication skills with supervisors and colleagues at the office.
5. Implemented a branch of interdisciplinary health sciences (i.e., nutrition sciences) to the research cluster.

Several weaknesses identified throughout the author's internship experience:

1. Adaptation to writing in Bahasa Indonesia due to being unfamiliar with the language barrier.
2. First-time experience to approach possible study participants independently to ask for their participation in the research.
3. Personal stress and anxiety management and regulation throughout the internship period.

4.3 Contribution of i3L and its values (grit, role-model, and integrity) to the benefits

The author maintained i3L's core values amidst the internship period and gained:

1. Endurance throughout the internship period (grit).
2. Managed to maintain manners, good deeds, and respect to the authorities throughout the internship period (role-model).
3. Reported the results obtained with transparency (integrity).

4.4 Contribution and relevance of classes at i3L to the internship success

The author firstly learned the theoretical foundations of nutrition science at i3L and gained:

1. A real-life participant recruitment experience for nutrition research.
2. A first-time experience to operate BIA instrument, implement digital dietary assessment, and administer online physical activity questionnaire for nutrition research as previously introduced in Human Nutrition Laboratory course.
3. Another scientific writing assignment to report the internship experience as previously introduced in Academic Writing and Scientific Writing and Presentation Skills courses.

4.5 Contribution of BRIGHT sessions for soft skills development

Several contributions of BRIGHT sessions throughout the author's internship experience:

1. The self-awareness session highlighting personality type and learning style was truly helpful throughout the author's internship process, especially for the author's personal time management and work effectiveness.
2. The author managed to maintain her interpersonal skills throughout the internship experience despite the working duration pressure.

4.6 Impact on the workplace

Several impacts identified throughout the author's internship experience:

1. Implemented a nutrition-based observational study at the research cluster.
2. Brought a fresh and new experience to the research cluster for accepting and undergraduate research intern.

CHAPTER 5: CONCLUSION AND RECOMMENDATION

5.1 Conclusion

This research internship experience concludes that the author has successfully fulfilled the original goals in the internship by learning how to conduct health research appropriately from the beginning until the end while also maintaining her soft skills at the workplace.

5.2 Recommendation

From this research internship experience, the author identified and acknowledged that an undergraduate internship colleague (i.e., peer or companion) would have enhanced the author's performance during the internship period. For future internship experience, learning together with a peer would be recommended for improved internship performance (i.e., as a discussion partner to stimulate critical thinking).

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APPENDICES

Appendix 1. Letter of ethical approval

UNIVERSITAS INDONESIA
FAKULTAS KEDOKTERAN

Gedung Fakultas Kedokteran UI
Jl. Salemba Raya No.6, Jakarta 10430
PO.Box 1358
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3922977, 3927360, 3153236,
F 62 21 3912477, 31930372, 3157288.
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Nomor : KET- \\\\ /UN2.F1/ETIK/PPM.00.02/2022

KETERANGAN LOLOS KAJI ETIK
ETHICAL APPROVAL

Komite Etik Penelitian Kesehatan Fakultas Kedokteran Universitas Indonesia – RSUPN Dr. Cipto Mangunkusumo dalam upaya melindungi hak asasi dan kesejahteraan subjek penelitian kedokteran, telah mengkaji dengan teliti protokol penelitian yang berjudul:

The Ethics Committee of the Faculty of Medicine, University of Indonesia – Cipto Mangunkusumo Hospital with regards of the Protection of human rights and welfare in medical research, has carefully reviewed the research entitled:

"Analisis Keseimbangan Energi pada Pasien Obesitas di *Exercise Center*."

Protocol Number : **22-10-1162**

Peneliti Utama / *Principal Investigator* : **Dr. dr. Nani Cahyani Sudarsono, Sp.KO**

Nama Institusi / *Name of the Institution* : **Center for Sports and Exercise Studies IMERI**

Lokasi Penelitian / *Site* : **Exercise Center, lantai SKY Gedung IMERI FKUI**

Tanggal Persetujuan / *Date of Approval* : 17 OCT 2022
(valid for one year beginning from the date of approval)

Dokumen Disetujui / *Document Approved* : **Proposal Penelitian, Version 0.2 tanggal 07 Oktober 2022**
Lembar Penjelasan kepada Calon Subjek, Version 0.2 tanggal 07 Oktober 2022

dan telah menyetujui protokol berikut dokumen terlampir.
and approves the above mentioned protocol including the attached document.

Ditetapkan di : Jakarta
Specified in

Ketua
Chair

Prof. dr. Rita Sita Sitorus, Ph.D., Sp.M(K)

** Peneliti berkewajiban
1. Menjaga kerahasiaan identitas subjek penelitian.
2. Memberitahukan status penelitian apabila:
   a. Setelah masa berlakunya keterangan lolos kaji etik, penelitian masih belum selesai, dalam hal ini *ethical approval* harus diperpanjang. Harap pengajuan perpanjangan etik dilakukan 2 minggu sebelum masa aktif lolos kaji etik habis.
   b. Penelitian berhenti ditengah jalan.
3. Melaporkan kejadian serius yang tidak diinginkan (*serious adverse events*).
4. Peneliti tidak boleh melakukan tindakan apapun pada subjek sebelum protokol penelitian mendapat lolos kaji etik dan sebelum memperoleh *informed consent* dari subjek penelitian.
5. Menyampaikan laporan akhir, bila penelitian sudah selesai.
6. Cantumkan nomor protokol ID pada setiap komunikasi dengan KEPK FKUI-RSCM.

Semua prosedur persetujuan dilakukan sesuai dengan standar ICH-GCP.
All procedure of Ethical Approval are performed in accordance with ICH-GCP standard procedure.

Appendix 2. Data collection procedure given to participants

Appendix 3. Informed consent given to participants

FKUI RSCM Rumah Sakit Umum Pusat

Komite Etik Penelitian Kesehatan
FKUI-RSCM

LEMBAR PENJELASAN KEPADA CALON SUBJEK

Saya, ***dr. Ria Lestari, Sp.KO/Tiffany Georgine T'sidkenu Widjaja***/Tim Peneliti **Klaster *Center for Sports and Exercise Studies* IMERI FKUI** yang diketuai oleh ***Dr. dr. Nani Cahyani Sudarsono, Sp.KO*** dari **Klaster *Center for Sports and Exercise Studies Indonesia Medical Education and Research Institute* Fakultas Kedokteran Universitas Indonesia** akan melakukan penelitian dengan judul ***Analisis Keseimbangan Energi pada Pasien Obesitas di Exercise Center*.**

Saya akan memberikan informasi kepada Saudara mengenai penelitian ini dan mengundang Saudara untuk menjadi bagian dari penelitian ini.

Saudara dapat berpartisipasi dalam penelitian ini dengan cara menandatangani formulir ini. Jika Saudara setuju untuk berpartisipasi dalam penelitian ini, Saudara kapan saja dapat secara bebas mundur dari penelitian ini. Jika Saudara menolak untuk berpartisipasi atau mundur dari penelitian ini, keputusan tersebut tidak akan mempengaruhi hubungan Saudara dengan saya.

Jika Saudara tidak mengerti tiap pernyataan dalam formulir ini, Saudara dapat menanyakannya kepada saya.

1. **Tujuan penelitian**
   Kami ingin menghitung keseimbangan energi pada pasien obesitas di *Exercise Center*. Untuk mengetahuinya kami harus mengumpulkan data asupan energi dan pengeluaran energi.

2. **Partisipasi dalam penelitian**
   Secara keseluruhan, penelitian ini akan berjalan selama 1 bulan. Jika Saudara memutuskan untuk ikut dalam penelitian ini, Saudara akan diminta kesediaannya untuk mengikuti jadwal kami dan memastikan bahwa Saudara dapat mematuhi jadwal tersebut. Penelitian ini akan melibatkan Saudara dalam pemeriksaan komposisi tubuh, pemasukkan data asupan makanan dan minuman, dan pengisian kuesioner aktivitas fisik. Setiap sesi pengambilan data akan dilakukan selama 20 menit (per pasien) dengan jangka waktu pukul 09.00 – 15.00 WIB (mengikuti jam buka *Exercise Center*).

3. **Alasan memilih Bapak/Ibu/Saudara**
   Saudara terpilih karena masuk ke dalam kriteria pemilihan subyek yaitu orang dewasa (≥18 tahun) yang memiliki IMT ≥25 kg/m^2 dan terdaftar sebagai pasien dan berlatih di *Exercise Center* IMERI FKUI.

4. Prosedur intervensi

1. Pada hari dimulainya penelitian, Anda diminta datang pada waktu yang ditentukan.
2. Anda akan diminta untuk menjalani pengukuran komposisi tubuh dengan alat BIA untuk mengetahui berat badan, IMT, massa lemak tubuh, persentase lemak tubuh, dan massa otot tubuh Anda.
3. Anda akan diminta untuk memasukkan data asupan makanan dan minuman ke aplikasi MFP selama 7 hari, dengan hari pengukuran BIA dihitung sebagai hari ke-1.
4. Anda akan diminta untuk mengisi kuesioner aktivitas fisik IPAQ-SF setelah 7 hari.

5. Risiko, efek samping dan tatalaksananya

Pemeriksaan komposisi tubuh, pemasukkan data asupan makanan dan minuman, dan pengisian kuesioner aktivitas fisik yang Saudara ikuti akan selalu mendapatkan pengawasan dari peneliti dan dokter.

6. Manfaat

Manfaat yang dapat Saudara dapatkan adalah mendapatkan wawasan tentang jumlah energi yang Saudara konsumsi dan keluarkan sehingga mencegah terjadinya tingkat keparahan risiko obesitas di masa depan serta pemeriksaan fisik untuk mengetahui komposisi tubuh secara gratis.

7. Kompensasi

Saudara tidak akan mendapatkan kompensasi atau imbalan akibat berpartisipasi dalam penelitian ini.

8. Pembiayaan

Pembiayaan penelitian ini akan ditanggung sepenuhnya oleh pihak peneliti.

9. Kerahasiaan

Semua data yang dikumpulkan dalam penelitian ini akan dijaga kerahasiaannya dan tidak dapat diakses tanpa izin tim peneliti. Presentasi hasil penelitian dalam pertemuan ilmiah / konferensi dan publikasi dalam jurnal ilmiah tidak akan mencantumkan nama Saudara.

10. Kewajiban subyek penelitian

Sebagai subjek penelitian, Bapak/Ibu/Saudara berkewajiban mengikuti aturan atau petunjuk penelitian seperti yang tertulis di atas. Bila ada yang belum jelas, Bapak/Ibu/Saudara bisa bertanya lebih lanjut kepada tim peneliti.

11. Hak untuk menolak dan mengundurkan diri

Saudara tidak harus berpartisipasi dalam penelitian ini bila tidak menghendakinya.

Saudara harus paham bahwa walaupun Saudara menyetujui untuk berpartisipasi, Saudara berhak untuk mundur dari penelitian ini.

Jika Saudara menolak untuk berpartisipasi atau mundur dari penelitian ini, keputusan tersebut tidak akan mempengaruhi hubungan Saudara dengan saya dan tidak akan berdampak pada standar pelayanan yang berlaku di *Exercise Center*.

Saya akan memberikan kesempatan pada Saudara pada akhir penjelasan ini untuk dapat mempertimbangkan keputusan yang akan diambil.

12. Informasi Tambahan

Saudara diberi kesempatan untuk menanyakan semua hal yang belum jelas sehubungan dengan penelitian ini. Bila sewaktu-waktu membutuhkan penjelasan lebih lanjut, Saudara dapat menghubungi **dr. Ria Lestari, Sp.KO (0811147474)/Tiffany Georgine T'sidkenu Widjaja (089657032899)**.

LEMBAR PERSETUJUAN KEIKUTSERTAAN DALAM PENELITIAN

Semua penjelasan tersebut telah disampaikan kepada saya dan semua pertanyaan saya telah dijawab oleh *tim peneliti/dokter*. Saya mengerti bahwa bila memerlukan penjelasan, saya dapat menanyakan kepada dr. Ria Lestari, Sp.KO atau Tiffany Georgine T'sidkenu Widjaja.

Sertifikat Persetujuan (*Consent*)	
Saya telah membaca semua penjelasan tentang penelitian ini. Saya telah diberikan kesempatan untuk bertanya dan semua pertanyaan saya telah dijawab dengan jelas. Saya bersedia untuk berpartisipasi pada studi penelitian ini dengan sukarela. _____ Nama subjek/wali _____ Tanda tangan peserta studi Tanggal_____ hari/bulan/tahun	Saya mengkonfirmasi bahwa peserta telah diberikan kesempatan untuk bertanya mengenai penelitian ini, dan semua pertanyaan telah dijawab dengan benar. Saya mengkonfirmasi bahwa persetujuan telah diberikan dengan sukarela. _____ Nama peneliti/peminta persetujuan _____ Tanda tangan peneliti/peminta persetujuan Tanggal_____ hari/bulan/tahun

Informasi Peneliti:

Peneliti Utama: **Dr. dr. Nani Cahyani Sudarsono, Sp.KO**
Klaster *Center for Sports and Exercise Studies* IMERI FKUI
Email: nani.cahyani@ui.ac.id
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Peneliti: **dr. Ria Lestari, Sp.KO**
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Peneliti: **Tiffany Georgine T'sidkenu Widjaja**
Program Studi Pangan dan Nutrisi Fakultas Biosains i3L
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Appendix 4. Similarity check