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POLISH JOURNAL OF PHYSIOTHERAPY

OFICJALNE PISMO POLSKIEGO TOWARZYSTWA FIZJOTERAPII

THE OFFICIAL JOURNAL OF THE POLISH SOCIETY OF PHYSIOTHERAPY

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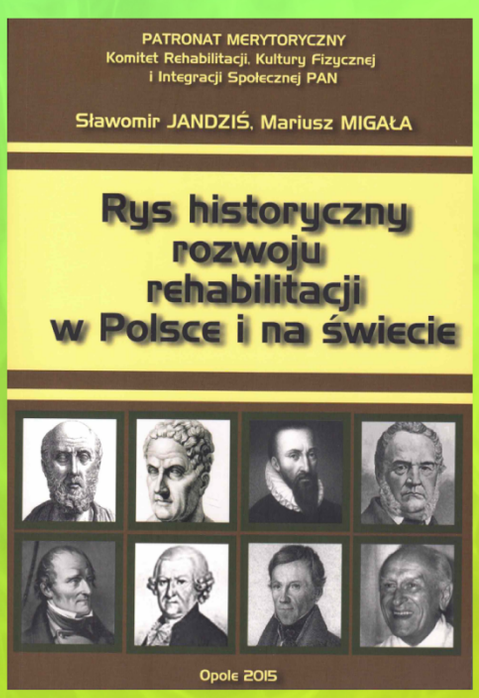

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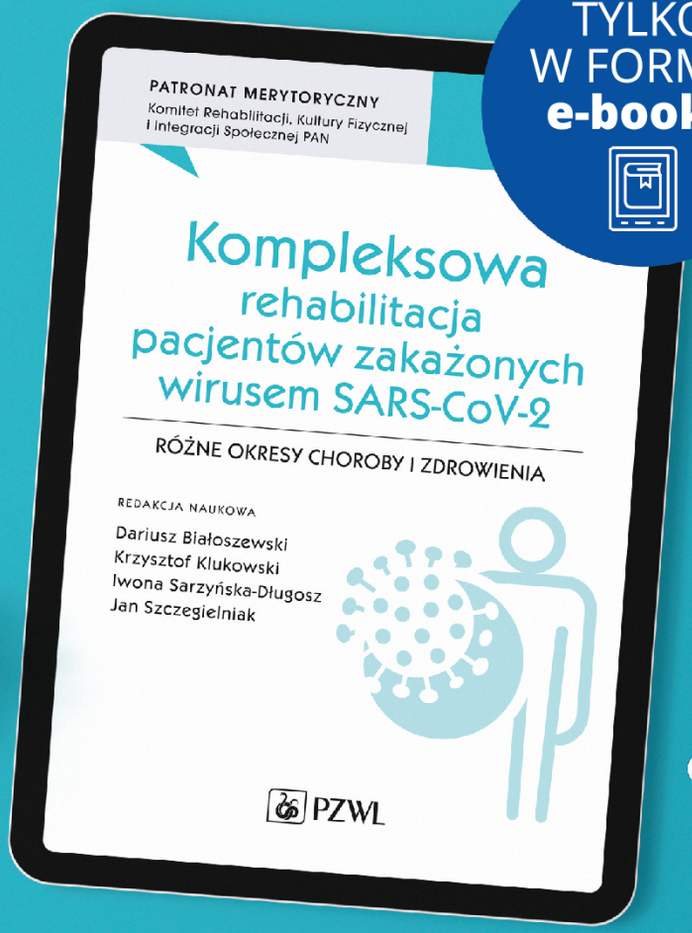

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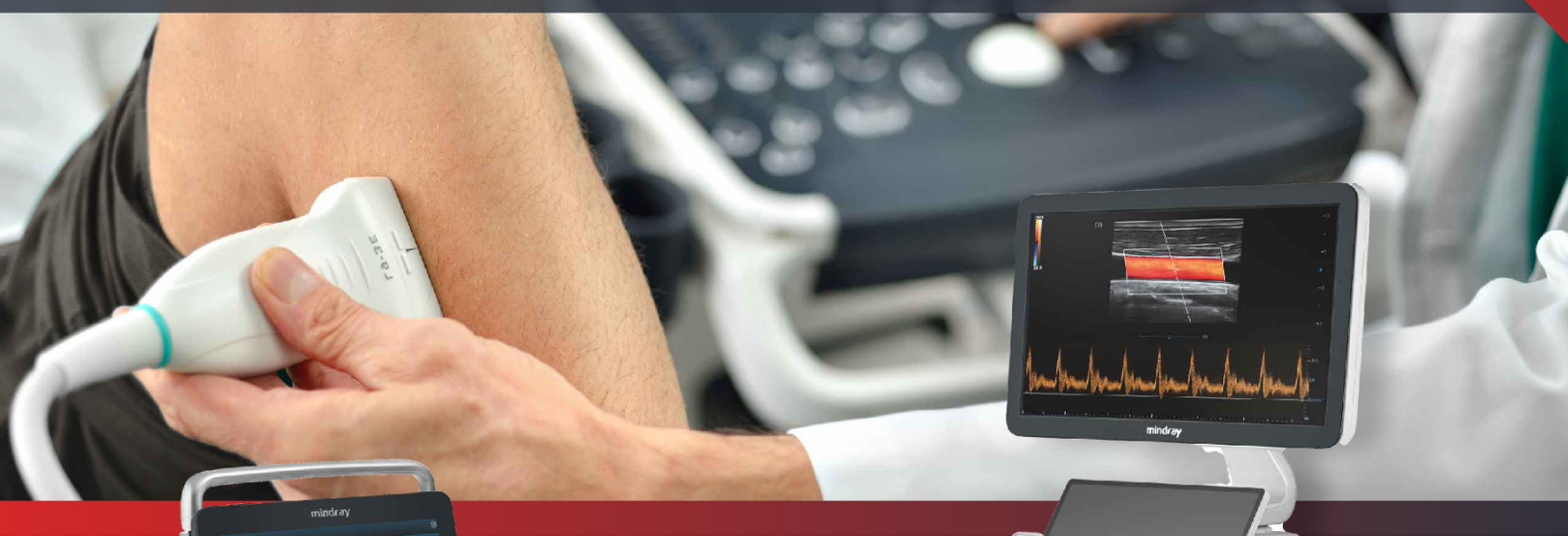

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Rehabilitacja kardiologiczna i fizjologia wysiłku – zapraszamy do rejestracji na wyjątkową konferencję w Wiśle

W dniach 11–13 maja w Hotelu Stok Wiśle odbędzie się wyjątkowe i interdyscyplinarne spotkanie specjalistów z całej Polski – 26. Sympozjum Sekcji Rehabilitacji Kardiologicznej i Fizjologii Wysiłku Polskiego Towarzystwa Kardiologicznego. Serdecznie zapraszamy do rejestracji.

26. Sympozjum Sekcji Rehabilitacji Kardiologicznej i Fizjologii Wysiłku Polskiego Towarzystwa Kardiologicznego to coroczne spotkanie specjalistów, zajmujących się rehabilitacją kardiologiczną, prewencją chorób układu krążenia i innymi formami aktywności fizycznej, która ma prowadzić do poprawy stanu naszego zdrowia.

Ta trzydniowa konferencja przeznaczona jest dla lekarzy kardiologów, specjalistów rehabilitacji medycznej oraz innych specjalności, którzy w swojej codziennej praktyce zajmują się rehabilitacją i fizjologią wysiłku, ale także dla fizjoterapeutów, pielęgniarek, techników i przedstawicieli innych zawodów medycznych, zainteresowanych tematyką spotkania, oraz studentów.

Jakie tematy zostaną poruszone podczas konferencji?

26. Sympozjum Sekcji Rehabilitacji Kardiologicznej i Fizjologii Wysiłku to konferencja, na którą zaproszeni zostali wybitni specjaliści z dziedziny kardiologii i nie tylko. Podczas wydarzenia wygłoszonych zostanie prawie 100 wykładów merytorycznych w ciągu aż 20 sesji. Uczestnicy będą mieli również szansę na udział w sesjach przypadków klinicznych, intensywnych warsztatach, a także panelach dyskusyjnych. To wydarzenie cechujące się dużą interdyscyplinarnością, dlatego z pewnością każdy znajdzie coś dla siebie.

Podczas wydarzenia kompleksowo pochylimy się nad dziedziną rehabilitacji kardiologicznej i fizjologii wysiłku. Wśród tematów wiodących znajdują się:

- rehabilitacja w dobie pandemii i po pandemii COVID-19;
- telerehebilitacja i rehabilitacja hybrydowa;
- rehabilitacja kardiologiczna w specyficznych grupach pacjentów;
- programy KOS-zawał i KONS;
- nowe standardy ESC, PTK i SRKiFW;
- Testy wysiłkowe i testy spiroergometryczne
- monitorowanie wysiłku fizycznego;
- prewencja pierwotna i wtórna chorób sercowo-naczyniowych;
- farmakoterapia pacjentów rehabilitowanych kardiologicznie i nie tylko;
- sport i aktywność sportowa w kardiologii;
- czynniki ryzyka chorób układu krążenia.

Program merytoryczny wydarzenia jest niezwykle bogaty i angażujący. Warto podkreślić także, iż na konferencji pojawią się specjalne sesje wykładów prowadzone przez zaproszone sekcje i asocjacje Polskiego Towarzystwa Kardiologicznego, m.in. Sekcję Kardiologii Sportowej, Asocjację Niewydolności Serca, Asocjację Elektrokardiologii Nieinwazyjnej i Telemedycyny, Sekcję Pielęgniarstwa Kardiologicznego i Pokrewnych Zawodów Medycznych, „Klub 30”, Sekcję Farmakoterapii Sercowo-Naczyniowej, Sekcję Prewencji i Epidemiologii, a także Polskie Towarzystwo Medycyny Sportowej.

„Pandemia wymusiła na nas zmianę paradygmatu rehabilitacji kardiologicznej”

Organizatorami wydarzenia są wydawnictwo naukowe Evereth Publishing oraz Sekcja Rehabilitacji Kardiologicznej i Fizjologii Wysiłku Polskiego Towarzystwa Kardiologicznego (SRKiFW). Przewodniczącą Komitetu Naukowego jest prof. dr hab. n. med. Małgorzata Kurpesa, Wiceprzewodniczącymi – prof. dr hab. n. med. Anna Jagier, dr hab. n. med. Dominika Szalewska, a Komitetu Organizacyjnego – dr n. med. Bartosz Szafran.

Dr n. med. Agnieszka Mawlichanów, Przewodnicząca SRKiFW, podkreśla, iż ostatnie Sympozjum miało miejsce w 2019 r. w Wiśle. W tym czasie udało się zorganizować wydarzenie w formule online, jednak zdaniem Przewodniczącej obecnie „wszyscy spragnieni jesteśmy spotkania osobistego, wymiany doświadczeń i bezpośrednich rozmów, nie tylko na sali wykładowej, ale i w kuluarach”.

– Cztery lata w sporcie to pełna olimpiada, a w naszej dziedzinie kardiologii można powiedzieć – cała wieczność. Pandemia wymusiła na nas zmianę paradygmatu rehabilitacji kardiologicznej, między innymi stworzyła pole dla rozwoju modelu hybrydowego i monitorowanego telemedycznie. W tym czasie ukazało się wiele ważnych dokumentów, stworzonych przez polskie i europejskie towarzystwa kardiologiczne, dotyczące rehabilitacji, prewencji i aktywności fizycznej. Dynamicznie w naszym kraju rozwija się też program KOS-zawał, przynoszący liczne korzyści, ale też budzący kontrowersje. O tym wszystkim i jeszcze wielu innych sprawach pragniemy podyskutować w czasie naszego majowego spotkania – zapowiedziała dr Mawlichanów.

Rejestracja na 26. Sympozjum Sekcji Rehabilitacji Kardiologicznej i Fizjologii Wysiłku możliwa jest na stronie internetowej konferencji rehabilitacja-2023ptk.pl/rejestracja/. Informacje na temat opłaty zjazdowej i wydarzeń towarzyszących znajdują się tutaj: rehabilitacja2023ptk.pl/oplata-konferencyjna/.

Informujemy jednocześnie, iż liczba miejsc na konferencji jest ograniczona, dlatego warto zarejestrować się już dzisiaj.

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Effects of intense workout trials and milk intervention on decrease surrogate markers of metabolic syndrome

Wpływ intensywnych treningów i spożycia mleka na zmniejszenie zastępczych punktów końcowych zespołu metabolicznego

Rizki Mulyawan[1(A,B,C,E)], Sumaryanti[1(A,D,G)], Sigit Nugroho[1(A,D)], Roxana Dev Omar Dev[2(D,F)]

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[2]Department of Sports Studies, Faculty of Educational Studies, Universiti Putra Malaysia, Malaysia

Abstract

Surrogate markers of metabolic syndrome complications is high levels of glucose and/or cholesterol in the blood. The purpose of this research is to determine whether or not various intensity exercise has a beneficial impact on blood glucose and cholesterol levels in young adults. As a consequence, this study was investigated about how exercise's influence on lowering the risk of metabolic diseases may be moderated by other factors, including by milk intake. Studies were conducted using a quasi-experimental, single-blind research design. Thirty-five participants were randomly assigned to one of four groups: control (C), moderate intensity (M), high intensity (H), or intermittent (I). The Sysmex XN-1000 is used for checking blood content, while the Cobas Pro is used to analyze blood chemistry in the lab. Using tools like the analysis of variance (ANOVA), the Mann-Whitney test, and the Pearson correlation coefficient, researchers may gauge the importance of inherent correlations and examine how group-level phenomena and interactions affect those coefficients. To sum up, we found that there was a statistically significant difference in glucose levels between the control group and the experimental group ($p = 0.012 < 0.05$), yet this difference was accompanied by a negative trend showing a rise in content. Also, there was a favorable tendency toward lower glucose and cholesterol levels across all compositions, while it was not statistically significant (p value > 0.05). To sum up, practically all of the variables point to a favorable tendency that that does not statistically significant – in the effect of exercise intensity combined with milk consumption. Exercise and milk intervention have been shown to have positive impacts, but further investigation or longer training sessions are needed to determine their true magnitude.

Keywords

supervised workout; milk intervention; metabolic syndrome; glucose; cholesterol

Streszczenie

Zastępczymi punktami końcowymi powikłań zespołu metabolicznego jest wysoki poziom glukozy i/lub cholesterolu we krwi. Celem niniejszego badania jest ustalenie, czy ćwiczenia o różnej intensywności mają korzystny wpływ na poziom glukozy i cholesterolu we krwi u młodzieży. W związku z tym w niniejszym badaniu zbadano, w jaki sposób wpływ ćwiczeń na obniżenie ryzyka chorób metabolicznych może być łagodzony przez inne czynniki, w tym spożycie mleka. Badania przeprowadzono przy użyciu quasi-eksperymentalnego projektu badawczego z pojedynczą ślepą próbą. Trzydziestu pięciu uczestników zostało losowo przydzielonych do jednej z czterech grup: kontrolnej (C), umiarkowanej intensywności (M), wysokiej intensywności (H) lub przerywanej (I). Sysmex XN-1000 służył do sprawdzania zawartości krwi, natomiast Cobas Pro służył do analizy chemicznej krwi w laboratorium. Korzystając z narzędzi, takich jak analiza wariancji (ANOVA), test Manna-Whitneya i współczynnik korelacji Pearsona, badacze mogą ocenić znaczenie nieodłącznych korelacji i zbadać, w jaki sposób zjawiska i interakcje na poziomie grupy wpływają na te współczynniki. Podsumowując, stwierdziliśmy istotną statystycznie różnicę w poziomie glukozy pomiędzy grupą kontrolną a eksperymentalną ($p = 0,012 < 0,05$), jednak różnicy tej towarzyszyła ujemna tendencja wzrostu zawartości. Zaobserwowano również korzystną tendencję niższych poziomów glukozy i cholesterolu we wszystkich kompozycjach, chociaż nie była ona istotna statystycznie (wartość $p > 0,05$). Podsumowując, praktycznie wszystkie zmienne wskazują korzystną tendencję, która nie jest istotna statystycznie – w efekcie intensywności ćwiczeń połączonych ze spożyciem mleka. Wykazano, że ćwiczenia i spożycie mleka mają pozytywny wpływ, ale potrzebne są dalsze badania lub dłuższe sesje treningowe, aby określić rzeczywistą skalę wpływu.

Słowa kluczowe

trening nadzorowany; spożycie mleka; zespół metaboliczny; glukoza; cholesterol

doi.org/10.56984/8ZG07B425

Introduction

Obesity increases the risk for diabetes, metabolic, and cardiovascular disorders [1]. According to the American Diabetes Association, being overweight can raise the risk of type 2 diabetes by as much as 80 percent. Eight out of 10 diabetics are overweight. The Ministry of Health of the Republic of Indonesia reported that 13.5 percent of individuals aged 18 and older were overweight between 2015 and 2019. Obesity is directly associated with diabetes, an illness that frequently affects children and teenagers. Numerous youngsters are afflicted with diabetes. Diabetes is currently the leading health concern in emerging nations. Both the incidence of type 1 and type 2 diabetes have increased the number of affected children and adolescents [2]. If children has been fat throughout childhood, he or she may acquire insulin resistance at a young age [3]. Therefore, this must be avoided so that it does not immediately impair insulin's capacity to assist filter glucose in the blood that is utilized for energy.

According to an emerging data source in Indonesia [4], the incidence of type 1 diabetes in 2000 was 0.00388 per 100,000 people, with 0.00292 per 100,000 male population and 0.00484 per 100,000 female population. In 2010, the incidence climbed to 0.02819 per 100,000, with men being affected at a rate of 0.03884 per 100,000 and females at 0.01761 per 100,000. In addition, don't forget about hypertension, which is the leading cause of stroke risk. Diabetes and stroke are both forms of a progressive illness that can lead to disability and death. Indonesia is the second-highest country with a mortality rate of 193.3 per 100,000 people due to stroke behind Mongolia (222.6 per 100,000 people), which has the highest death rate due to stroke at 222.6 per 100,000 people [5].

Numerous studies have previously demonstrated the value of physical exercise habits in reducing the chance of acquiring degenerative illnesses [1]. As a very inexpensive medicine, exercise can help reduce the buildup of glucose and cholesterol in the blood owing to poor and irregular eating habits. Fifty minutes of moderate-intensity exercise each session, at least three times per week, can provide significant physical advantages for adolescents [6]. Additionally, from the age of adolescents, twice-weekly extra strength training is now permitted. After becoming accustomed to active behavior, active persons are recommended to start paying attention to their food and drink consumption in order to avoid being dehydrated. During physical exercise, it is difficult to ingest heavy foods, which take longer to digest than liquids, therefore it is preferable to consume beverages that can fulfill the demands of rapid energy production. Water only satisfies thirst for less than one hour of activity [7] for more than one hour of exercise, you need fluids containing sodium and potassium [8, 9]. Additionally, it would be preferable if the fluids consumed during exercise contained macronutrients that can be rapidly filtered for energy production; cow's milk is a unique and highly recommended example [10, 11]. Milk is a highly effective alternative beverage for aiding recovery after strenuous activity [12]. Milk's macronutrient composition can assist restore lost fluids and nutrients, therefore stimulating the insulin hormone to rapidly filter and then generate energy production cycles.

Currently, low-carbohydrate and high-fat dietary patterns are being established; these dietary patterns are frequently adopted by healthy individuals who wish to avoid weight gain [13]. The practice of eating sugary beverages has the potential to cause weight gain and chronic disease, hence efforts are required to limit daily intake [2]. The expected rise in glucose and cholesterol levels in adolescents was not realized. High levels of activity and energy are the primary reason why adolescents disregard their health. This significant issue can result in a multifold rise in the buildup of diabetes or cholesterol, which unwittingly constricts blood vessels through the formation of plaque. Until far, the majority of research have solely considered milk as an excellent alternative recovery beverage. Similarly, varying intensities of exercise have been proven to lessen the chance of specific individuals acquiring diabetic, metabolic, and cardiovascular disorders [1]. Conversely, no one has ever merged training models based on free body weight with traditional Indonesian games and practical sports activities. No one has been able to collaborate on a form of free body weight-based exercise that combines traditional games and applied games through four different intensity groups, control or C (no regular exercise), moderate exercise intensity (M), high (H), and intermittent (I), which is accompanied by the regular consumption of cow's milk during two consecutive months that include 24 training sessions.

One meta-analysis [14] found limited evidence that appropriate exercise regimens increase cardiovascular risk, highlighting the need of investigating the effects of aerobic exercise, strength training, or both on cardiovascular risk factors. It has been demonstrated that exercise affects metabolism, and several research studies have shown that endurance training sessions can enhance insulin sensitivity and glucose tolerance [15–19]. A modest quantity of fat consumption or infusion during exercise can improve insulin resistance [3, 20, 21]. Exercise may reduce insulin resistance [20, 21], however the effect of exercise on glucose tolerance with high-fat, low-carbohydrate diets is little understood. The drinking of milk after exercise has been found to lower glucose levels and boost fat oxidation, according to a research [22]. The high obesity prevalence is a consequence of sedentary activity, irregular eating and drinking behaviors, and a preference for sugary foods and beverages. However, from the perspective of food consumption and physical activity, it demands much more work, as it is sometimes effective but sometimes counterproductive. On the other hand, The combination of physical exercise, dietary consumption, and behavioral treatments can enhance adolescents' cognitive ability and academic performance [23].

Recently, the majority of research have only examined the effect of exercise on glucose and/or cholesterol levels, and have not yet addressed the intervention of regular milk consumption, especially for up to two months or 24 sessions in a row. In addition, this study updated the training model by combining a kind of free body weight training with conventional games and games into a core exercise developed via research and development of training models. It is unknown to what extent free body weight exercise mixed with traditional sports and a mixture of games as a type of warm-up has an effect on glucose and cholesterol levels when combined with the twice-daily consumption of milk. Therefore, more research is required so that the combination of exercise and milk consumption can have a beneficial effect on the physiological components of the blood. Little is known about the effects of this combination of exercise models on glucose and cholesterol,

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two indications of degenerative illness. This study intends to determine how the intensity of exercise performed using the free body weight model in alongside traditional Indonesian games and activities followed by milk consumption treatments affects the glucose and cholesterol levels in the blood of adolescents. The desired outcome of this study is to determine the effect difference between groups and the link between the two variables.

Methods

Design

This research implemented a quasi-experimental, single-blind, randomized controlled trial approach [24]. The research was done for two full months, three times each week, over the course of 24 exercise sessions. Over two months, the treatment group was separated into four groups: the control group (C), moderate intensity (M), high intensity (H), and intermittent (I). In addition, it is paired with moderator factors in the form of milk consumption interventions to examine the efficacy of the effect of changes in exercise intensity accompanied by milk intake on metabolic diseases as measured by blood glucose and cholesterol levels. This study examines four dependent factors, two independent variables, and one moderating variable.

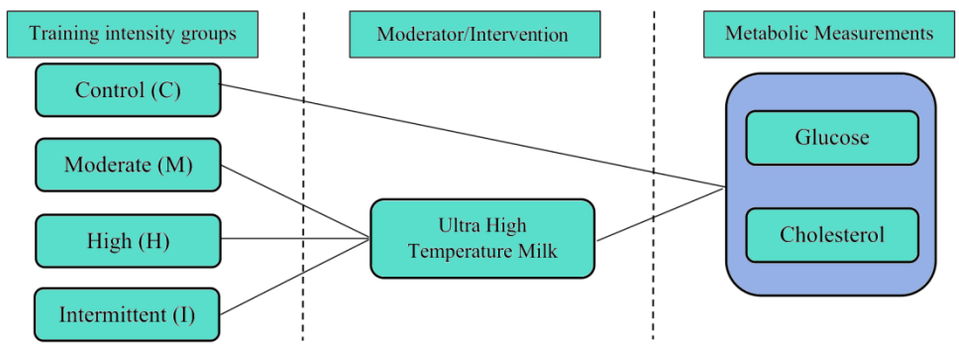

Figure 1. Research design

Participants

This study involved 35 individuals with a significant level of involvement. Participants willingly provided informed consent and volunteered to participate in this study until its completion. Subjects were separated into four various intensity groups: the control group (C), the moderate intensity group (M), the high intensity group (H), and the intermittent group (I). This study's subjects were selected based on criteria like their willingness to participate and their involvement as volunteers, the age between 18 and 21 at the period of participation, whose lack of a milk allergy, not being an athlete and overweight or obese. For exclusion criteria for people who are allergic, unwell, or injured, active athletes, outside the age range of 17 to 20 years, and unwilling to participate fully in the study.

This has been accomplished through an online research participant competition. Participants then filled out a questionnaire and provided informed consent at the beginning of the section for inclusion criteria by writing a statement indicating their willingness to participate in this research for 24 sessions. Therefore, random sampling was used to pick individuals for this study, who were then divided into groups C, M, H, and I based on their respective fitness levels, because it requires involvement in groups that need the ability to support during training. Great fitness participants were separated into groups H and I, whereas moderate fitness participants were separated into groups C and M.

Ultra High Temperature (UHT) Milk

According to the recommendations of a number of previous studies that have focused on exploring milk's potential as a beverage for recovery after exercise, the chocolate flavor variety was ingested by the participants [25–28]. The components of the UHT milk that was drank during the course of the investigation, which consisted of a total of 24 sessions, are detailed in table 1.

Table 1. UHT milk contents (200 ml)

Contents	Amount per serving
Total Energy (kkal)	160
Total Fat	4 g, 6%
Cholesterol	10 mg, 4%
Saturated Fat	3 g, 15%
Protein	6 g, 10%
Total Carbohydrate	24 g, 7%
Sugar	19 g
Natrium	45 mg, 3%
Kalium	260 mg, 5%
Calcium	15%

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Protocol

Four types of training are provided, including traditional games as a form of warm-up, free body weight as a form of core training, then as an alternative, the use of variations in game sports is sometimes done in anticipation of boredom during the implementation of a two-month training program, and in one training session, variations of fun games are used as a form of cooling down to conclude the session.

Checking the pulse during exercise is the primary sign of intensity. Through the use of a Polar band, the pulse may be tightly regulated throughout moderate, vigorous, and intermittent activity. Medium intensity requires 64–75% Maximum Pulse Rate (DNM), high intensity utilizes 76–95% Maximum Pulse Rate (DNM) [29, 30], and intermittent [31] uses a percentage range of 86% DNM (in a matter of averages in each movement).

This study involved a moderator with the format of an intervention for consuming milk after exercise, so it was necessary to employ a control mechanism to avoid interactions with food intake consumed. Regular checks were conducted through reports on food intake for two consecutive months, which were submitted during exercise via a form that all participants were required to submit. Without exception, participants must fill out and submit a food consumption report.

To determine changes in glucose and cholesterol, blood must be drawn. Blood samples were taken twice, first at the beginning, before the intervention (pre-test), and once more after two months of training and milk consumption (post-test). At the time of blood sampling, the participant is needed to fast for eight hours prior to the test. Two hours before the test, 500 ml of mineral water were administered to the individual so that the body's state would become homeostatic (Syafriani et al., 2014). During the test, the individual was required to do maximal circuit training that measured the growth of physical components during the activity. After the test, the subject's milk consumption was validated, and blood samples were obtained. After the blood was drawn, the individual was permitted to ingest substantial meals.

Instruments

Blood sample was conducted at a laboratory specializing in venous blood collection. Six cc of blood samples were collected. The Sysmex XN-1000 was utilized for laboratory measurements of blood volume, followed by the Cobas Pro c116 for blood chemical analysis. During the pre-test (before to intervention) and post-test, venous blood samples were obtained (after two months of treatment).

Data analysis

IBM statistics 24, ANOVA calculations, and the Mann-Whitney test were used to compare each group's data. To establish a strong correlation between glucose and blood cholesterol data, Pearson Correlation was employed to standardize the data.

Ethical clearance

This research has been approved by the ethical commission and the Medical and Health Research Ethics Committee (MHREC) of the Faculty of Medicine, Public Health, and Nursing, Gadjah Mada University, with the reference number KE/FK/0637/EC/2022.

Research limitations

This study cannot regulate all subject activities, such as food consumption, hence these shortcomings are predicted utilizing daily food intake records submitted by Google form. This study's control group was not provided any milk or was not permitted to drink or consume milk-derived items, which may have constituted an arbitrary choice of eating or drinking.

Results

This research discovered a number of facts on the impact of two months of rigorous therapy through 24 training sessions. The results revealed a favorable trend, in this case a drop in glucose and cholesterol levels, although it was not statistically significant (p-value > 0.05). Nevertheless, the findings of this study show that vigorous exercising for 24 sessions followed by frequent milk consumption might reduce the incidence of degenerative illnesses.

Table 2. Glucose and Cholesterol preferences using ANOVA test after 2-months intervention

Variables	Mean ± SD	Sig.
Glucose	77.69 ± 18.88	0.380
Cholesterol	167.63 ± 35.9	0.094

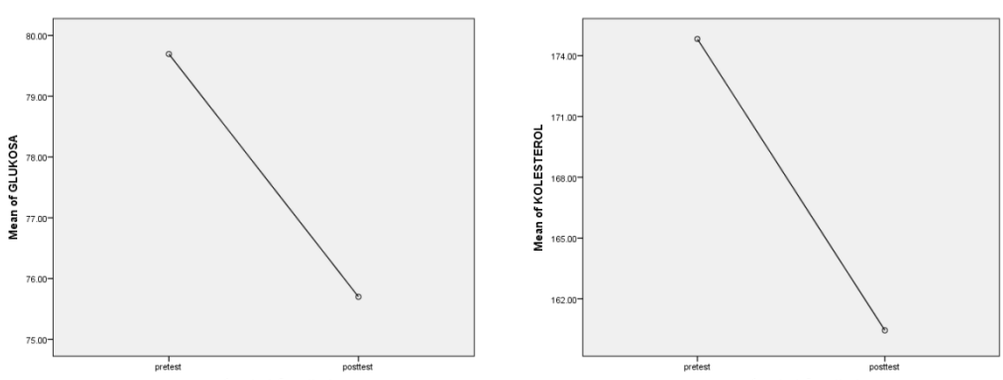

Figure 2. Means plot trend of glucose and cholesterol

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Table 3. Comparison within each data group

Variables	Group	Time Data Collection	Mean ± SD	Sig.	Trend
Glucose	Control	Pre-test	78.1 ± 6.92	0.012*	Negative
		Post-test	156.75 ± 17.6		
	Moderate	Pre-test	82.4 ± 9.3	0.833	Positive
		Post-test	80.87 ± 27.49		
	High	Pre-test	82.25 ± 26.67	0.859	Positive
		Post-test	80.70 ± 26.67		
	Intermittent	Pre-test	78.28 ± 5.01	0.386	Positive
		Post-test	62.2 ± 30.6		
Cholesterol	Control	Pre-test	172.25 ± 22.86	0.080	Positive
		Post-test	156.75 ± 17.6		
	Moderate	Pre-test	174.75 ± 34.2	0.058	Positive
		Post-test	159.08 ± 43.78		
	High	Pre-test	177.66 ± 27.1	0.374	Positive
		Post-test	164.71 ± 40.11		
	Intermittent	Pre-test	174.4 ± 30.29	0.445	Positive
		Post-test	160.64 ± 58.2		

The interactions between the various variables according to each group (control, moderate, high, and intermittent intensity) are shown in Table II. There was only one variable in the control group, namely glucose (0.012 < 0.05), which had a significant difference when compared between pre- and post-test, but the trend turned out to be negative, because there was an increase in the value of glucose levels, even though what was expected was significant with the trend of lowering glucose levels, as an indicator of a reduced risk of developing diabetes.

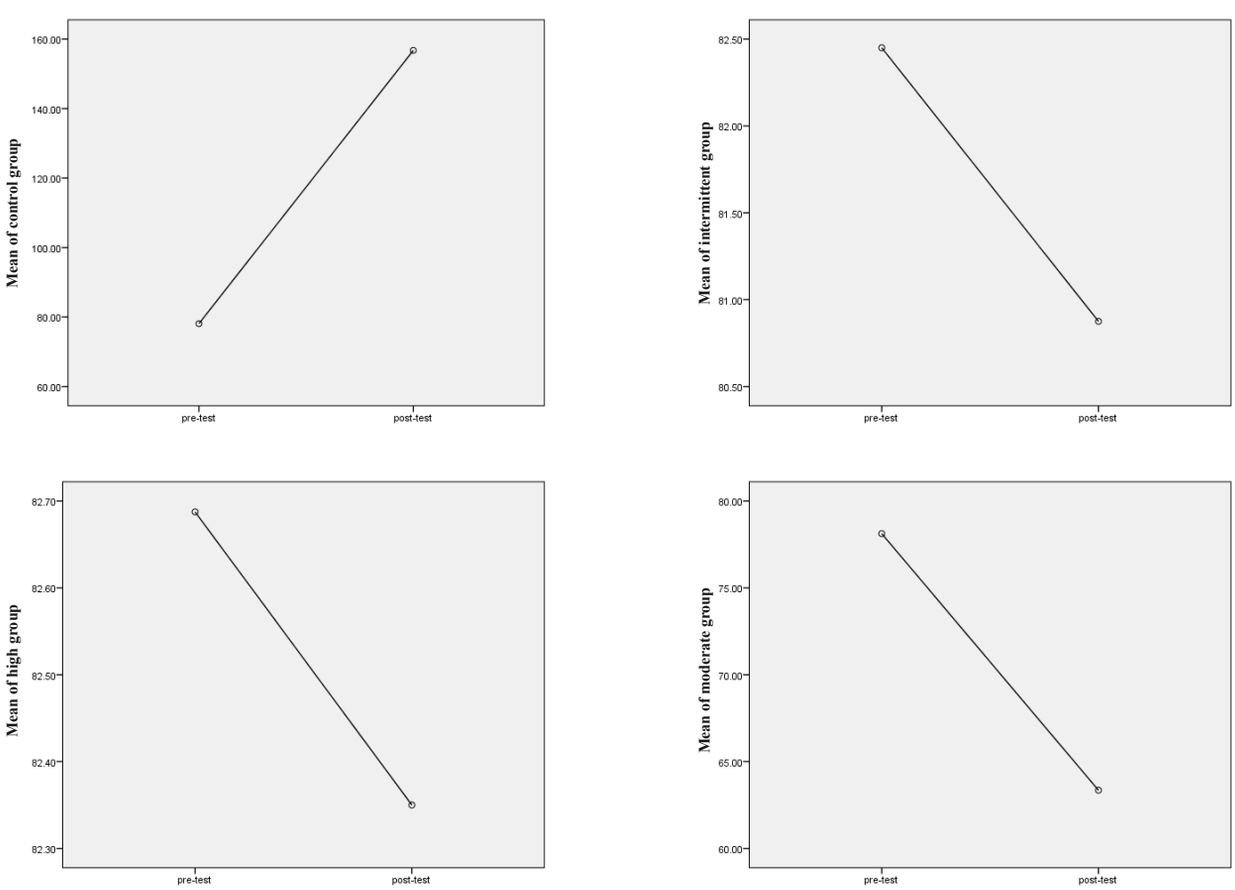

Figure 3. Means plot trend on glucose in various group

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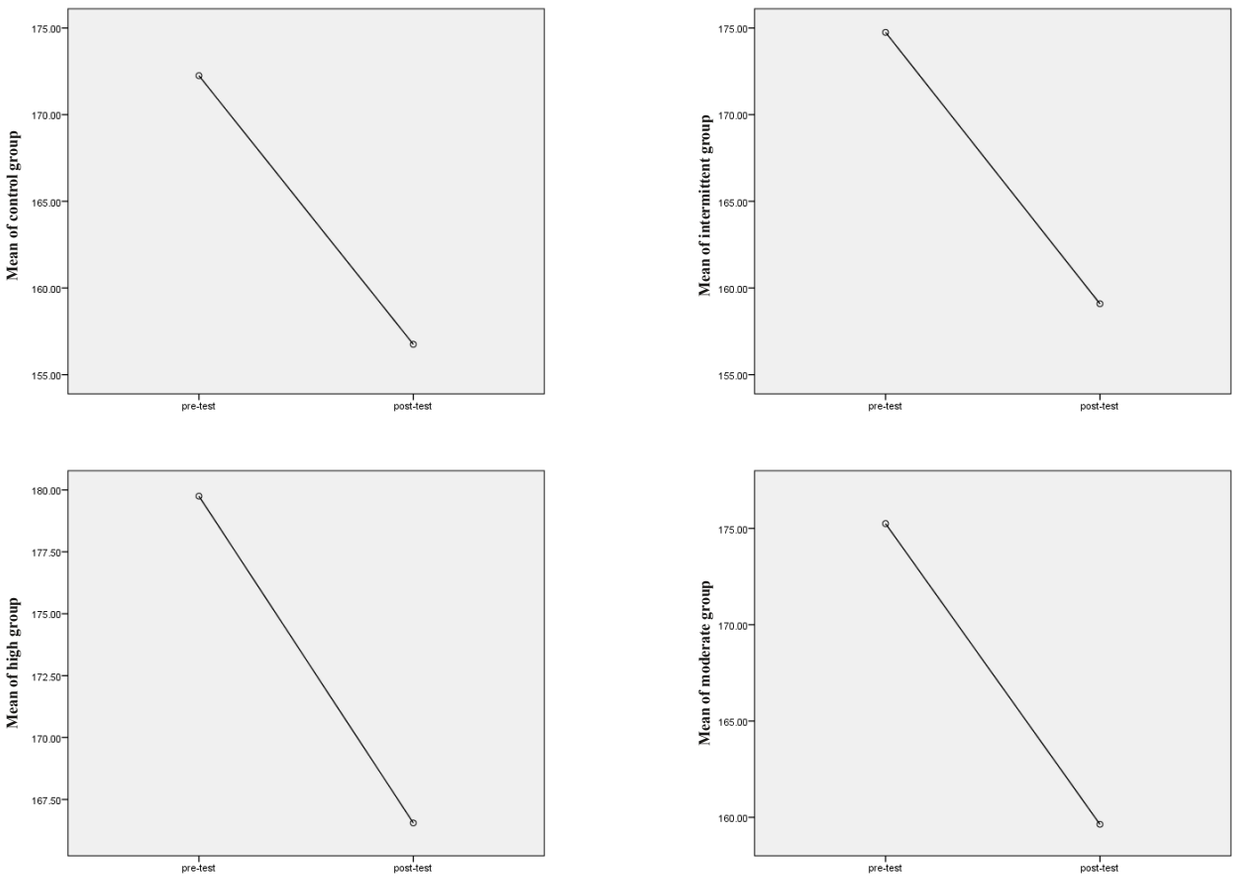

Figure 4. Means plot trend on cholesterol in various group

Many variants of the data were collected from the data in this study, and it was also determined whether there was a link between glucose and cholesterol from the data gathered. As demonstrated by the calculation utilizing Pearson Correlation, which assesses the correlation between variables, extremely significant findings (0.000 < 0.05) are achieved. Because the two have been shown to be very significantly related, efforts are needed to reduce glucose and cholesterol levels in the blood as indicators of degenerative diseases. Aside from physical activity, suppression of glucose and cholesterol levels needs to be assisted by consuming food and/or drink intake, one of which is milk, which is commonly consumed every day.

Table 4. Correlation between glucose and cholesterol

Variable	Pearson Correlation	
	r	Si
Glucose – Cholesterol	0.887	0.000**

Discussions

Chronic or abrupt elevations in cholesterol levels (dyslipidemia) are directly related to coronary heart disease. Reducing total cholesterol is seen as an important benchmark for cardiovascular disease prevention. It has been demonstrated that exercise has a good effect on the etiology, symptoms, and physical fitness of a person with dyslipidaemia, in addition to lowering blood cholesterol levels [32]. According to prior research, the best method, frequency, intensity, and duration of exercise to enhance or decrease cholesterol have yet to be determined. This study demonstrates that there is a tendency toward decreasing cholesterol levels in accordance with what has been advised in the prior literature, which can give the same advantages for avoiding cardiovascular disease as the gold standard [33]. Similar to the earlier study conducted on obese individuals, it was shown that twelve weeks of aerobic exercise had little effects on cholesterol levels [3]. In addition, the treatment of changing intensity training and milk consumption interventions had an effect on glucose levels, which decreased in a nonsignificant manner after two months of exercise. This study confirms that glucose and cholesterol can exhibit a substantial positive trend (reduction) and thus be utilized to combat diabetes [34] dan cardiovascular disease [32].

The findings of a two-month, three-times-a-week intensive treatment program reveal a substantial correlation between glucose and cholesterol levels. Although it was not statistically

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significant (p-value > 0.05), 24 sessions of free-weight training shown a good tendency toward lowering glucose and cholesterol levels. As is well-known, milk with Ultra High Temperature has been made safe for eating for a very long time and flavored in a number of ways. Milk's glucose content is vital for glycogen recovery after exercise, as glycogen loss in the muscles during exercise induces the development of plasma insulin and protein content [35]. Findings of this investigation were in line with previous studies. published by Takahashi and colleagues (2021) utilizing mice with certain data retrieval depths obtained at the place of entrance of nutrients from the gastrointestinal tract. According to studies, a large ingestion of carbohydrates after exercise increases glucose transporters in the jejunum region, but does not result in an increase in muscle glycogen after recovery [36]. Thirty minutes after exercise, there was no substantial difference in muscle glycogen and hepatic glycogen. It may be argued that consuming high-carbohydrate foods after exercise enhances absorption activity in the jejunum, however it turns out that this has little influence on glycogen resynthesis in exercised muscles. There is no variation in the overall number of protein transporters that play a role in glucose absorption and glycogen production in the muscles. Although involving mice on another research indicates that consuming high amounts of glucose stimulates insulin production (which subsequently initiates glucose absorption) and boosts muscle glycogen recovery, consuming little amounts of glucose can promote glycogen recovery in the liver [37]. Milk is also rich in macronutrients can help individuals feel satisfied [27], hence limiting their urge to consume extra food sometime. Because, in terms of appearance dependent on temperature, neither cold nor ordinary temperatures affected glucose, plasma insulin, or muscle glycogen levels. In contrast, the concentration of glycogen in the liver was significantly elevated in the group given hot beverages [38].

Several additional research have found no correlation between physical exercise and a decrease in inflammatory symptoms [39]. Due to the inconsistency of the physiological effects of physical activity and other forms of exercise, more information is required regarding the regulatory effects on adipokine and cytokine metabolism and the significance of glucose homeostasis, particularly in subjects with impaired glucose regulation. a large body of research suggests that the illness is more prevalent among specific groups. For example, aerobic and strength training had different effects on adipokines in a group of type 2 diabetics [40]. Although physical activity often lowers inflammatory symptoms, high-intensity strength training has been demonstrated to reduce TNF-α concentrations [41] and aerobic exercise did not modify TNF-α [42, 43], although physical exercise usually reduces inflammatory symptoms [44]. TNF-α indirectly affects insulin signaling and promotes insulin resistance in several organs [41].

The advantages of training have been found to generate considerable changes in movement and the involvement of brain-derived neurotrophic factor (BDNF), which is myokine, in mice that run downhill. On days 1, 3, 7 and 14 following exercise, the concentrations of protein transporters and serum BNDF dramatically rise significantly [45]. This rise in serum BDNF is capable of enhancing the exercise-induced muscle regeneration. Not only do mice provide proof of the advantages of exercise, but it is also evident that people experience the same, if not greater, benefits. Physical activity, on the other hand, is known to decrease the production of adipokines from adipose tissue and cytokines from the muscles and immune system [40] and to lower the risk of cardiovascular disease, metabolic syndrome, and type II diabetes [1]. Aerobic exercise is more effective than anaerobic exercise at suppressing harmful cytokines (Chemerin) in cholesterol-lowering gene expression experiments; if Chemerin levels continue to rise, they have the potential to disrupt systemic metabolism and inflammation. [46]. The drop in Chemerin concentration was comparable to that of the strength training group.

According to recent studies mentioned that aerobic exercise has been demonstrated to reduce body fat, insulin levels, inflammatory markers, and increase physical fitness in overweight and obese children and adolescents [47]. In a published review paper, exercise was demonstrated to reduce total cholesterol levels [32], However, increasing the duration or volume of exercise reduces the advantages of exercise on cholesterol levels [48]. Aerobic exercise [3, 49] and weight training [46] are both helpful for decreasing cholesterol levels.

Physical activity has been shown to improve HDL cholesterol and total cholesterol in healthy people's blood plasma [50, 51]. In addition, it was verified by the findings of prior research that demonstrated an increase in muscle insulin sensitivity and glucose utilization [52]. Specifically, the involvement of the newly identified adipokine, Chemerin, in glucose regulation merits additional investigation. Aerobic exercise was also capable of lowering Chemerin levels in the obese group [3]. Chemerin is a member of cytokines, which are chemical substances that serve as a method of communication between immune cells, but Chemerin is a novel variety with a deleterious effect on systemic metabolic cycles. Increasing levels in the body will increase the chance of getting cardiovascular disease [1]. Interestingly, aerobic activity can inhibit the progression of Chemerin. Aerobic exercise can increase the amount of the ATP-Binding Cassette Transporter (ABCA1) transporter, whose job it is to prepare instructions for the production of the ATP-binding cassette transporter protein, which functions to export phospholipids and cholesterol, according to an in-depth discussion of genes [49]. This demonstrates that the greater the intensity of aerobic activity, the more active the transporter genes become, resulting in an increase in energy binding (ATP) in the phospholipids so that they are involved in metabolic activities and not deposited as plaque.

A dysfunctional fat tissue is one of the causes of insulin resistance. Changes in the concentration of adversely behaving adipokines are early indicators of dysfunctional adipose tissue and increase the risk of developing diabetes [46]. This occurs often among those with an overweight or obese body mass index [3, 46]. It turns out that Chemerin can decrease regardless of the kind of aerobic activity, although cholesterol concentrations are still higher in the aerobic exercise group [46]. Future study must investigate being unique to the obese population, with training sessions lasting longer than three months and being conducted in a controlled manner to ensure a real experi-

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ment control. In addition, if possible, the sample size should be increased.

Conclusions

Blood glucose and cholesterol levels tended to decline as a result of an intervention that included both physical activity and milk consumption after exercise, but the reductions were not statistically significant. However, only water consumption has a detrimental affect that can be reversed. It was proposed that consuming milk and engaging in physical activity will reduce the rise in blood glucose and cholesterol levels, hence decreasing the risk of metabolic syndrome. Future research is predicted to be able to quantify the length of the study, which may incorporate longer training sessions and more stringent control, in order to determine the significance of the effect of the exercise and milk intervention.

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