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ORIGINAL ARTICLE

Development and Pilot Trial of Mixed Exercise Programme for Hypertensive Individual: Breathing Exercises and Bodyweight HIIT

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ABSTRAK

Perubahan gaya hidup adalah penting dalam pengurusan bukan farmakologi bagi penyakit kronik tidak berjangkit, seperti hipertensi. Pengurusan hipertensi boleh dicapai melalui senaman aerobik, senaman rintangan dinamik dan latihan gabungan, yang menggabungkan kedua-dua senaman aerobik dan rintangan dinamik dalam satu sesi atau pada hari yang berbeza. Kajian ini bertujuan untuk membangunkan program senaman yang menggabungkan latihan interval intensiti tinggi (HIIT) dan latihan pernafasan. Untuk membangunkan program senaman, kami menggunakan dua strategi iaitu ulasan penskopan yang komprehensif untuk mengenal pasti protokol latihan pernafasan dan konsensus pakar untuk menentukan komponen HIIT. Selain itu, kajian rintis dijalankan ke atas 10 individu yang menghidap hipertensi untuk menilai perubahan dalam purata tekanan darah (BP), kadar denyutan jantung (HR), kecergasan kardiorespiratori dan kekuatan otot selepas melakukan senaman tiga kali seminggu selama 10 minggu. Kami merangka regimen latihan pernafasan selama 10 minit, dua kali sehari, pada waktu pagi dan petang, tiga kali seminggu, pada kadar pernafasan 6 kali seminit. Lapan senaman berat badan dipilih untuk HIIT. Peningkatan yang ketara diperhatikan dalam purata BP sistolik (p=0.001), BP diastolik (p=0.001), HR (p=0.046) dan kecergasan kardiorespiratori (p=0.002) sebelum dan selepas intervensi. Modul yang dibangunkan, yang menggabungkan latihan pernafasan mendalam dan HIIT, secara berkesan mengurangkan tekanan darah sistolik dan diastolik, menurunkan kadar denyutan jantung dan meningkatkan kecergasan kardiorespiratori.

Kata kunci: *Hipertensi; latihan interval berat badan intensiti tinggi; latihan pernafasan; senaman campuran*

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ABSTRACT

Lifestyle changes are essential in non-pharmacological management of non-communicable chronic diseases, such as hypertension. Hypertension management can be achieved through aerobic exercise, dynamic resistance exercise and concurrent training, which combines both aerobic and dynamic resistance exercises in a single session or on different days. This study aimed to design an exercise program integrating high-intensity interval training (HIIT) and breathing exercises. To develop our exercise program, we employed two strategies: a comprehensive scoping review to identify the breathing exercise protocol and expert consensus to determine the HIIT component. Additionally, a pilot study was conducted on 10 hypertensive individuals to evaluate changes in mean blood pressure (BP), heart rate (HR), cardiorespiratory fitness and muscle strength after performing the exercises three times per week for 10 weeks. We designed a breathing exercise regimen of 10 minutes, twice daily, in the morning and evening, three times a week, at a respiratory rate of 6 breaths/minute. Eight bodyweight exercises were selected for HIIT. Significant improvements were observed in mean systolic BP (p=0.001), diastolic BP (p=0.001), HR (p=0.046), and cardiorespiratory fitness (p=0.002) before and after the intervention. The developed module, combining deep breathing exercises and HIIT, effectively reduces systolic and diastolic blood pressure, lowers HR and enhances cardiorespiratory fitness.

Keywords: Breathing exercises; high-intensity body weight interval training; hypertension; mixed exercise

INTRODUCTION

The 2018 Indonesian Basic Health Study reported a hypertension prevalence of 34.11%, with higher rates in women (36.85%) compared to men (31.34%) and slightly greater prevalence in urban (34.43%) versus rural areas (33.72%) (Riskesdas 2018). Regular physical activity and exercise are widely recommended by various organisations for preventing, treating and controlling hypertension (Johnson et al. 2014; Pescatello et al. 2015). Numerous randomised controlled trials (RCTs) and meta-analyses have demonstrated the antihypertensive effects of exercise (Cao et al. 2019; Costa et al. 2018; Leal et al. 2020). Meta-analyses indicate that aerobic exercise can reduce blood pressure (BP) by 5-7 mmHg, and dynamic resistance training can lower BP by 2-3 mmHg in hypertensive individuals (Cornelissen & Smart 2013; Cornelissen & Fagard 2005; Cornelissen et al. 2011).

High-intensity interval training (HIIT) involves multiple cycles of short or moderate duration and high intensity (over 85% of VO2 max), with rest intervals of lighter exercise between each cycle. HIIT has been shown to be a time-efficient alternative to continuous moderate-intensity training (CMIT) for effectively lowering BP in hypertensive individuals and is equally effective at improving body composition and cardio-metabolic risk factors (Costa et al. 2018). It also reduces the stress-induced rise in blood pressure (Farah et al. 2021). Research by Guiraud et al. (2012) indicates that HIIT is a safe and effective training approach for cardiac rehabilitation, surpassing CMT in improving cardiorespiratory fitness across various populations (Ciolac et al. 2011; Tjønna et al. 2008). HIIT has been found to enhance endothelial function (Tjønna 2008), insulin sensitivity (Tjønna 2008), markers of sympathetic activity (Ciolac et al. 2011), arterial

stiffness (Guimarães et al. 2010), blood glucose levels, VO2max and muscle strength (Fitri et al. 2015).

HIIT has gained popularity for various reasons, with most exercises involving running, walking, treadmill walking, and stationary cycling. Recently, fitness training variations integrating multi-stimulation, circuit-like, multi-joint and high-intensity training (Circuit HIIT) have become popular among fitness enthusiasts (Buckley et al. 2015). Our aim was to develop a HIIT program for hypertensive individuals using bodyweight exercises that require no additional equipment, making it accessible for hypertensive people. HIIT can positively affect blood pressure through its impact on sympathetic activity, improved endothelial function, and decreased oxidative stress, collectively helping prevent and treat hypertension (Nasi et al. 2019). Integrating deep breathing exercises into this module could further enhance hemodynamic responses in hypertensive individuals by activating parasympathetic activity (Ma et al. 2017).

Deep breathing exercises (BE) with a respiratory rate of 6 or 10 breaths/minute prolong diaphragmatic contraction, reduce respiratory rate, increase inspiratory and expiratory volumes, and cause arteriolar dilatation, enhancing oxygen delivery to the bloodstream (Ma et al. 2017). This technique lowers systolic (SBP) and diastolic blood pressure (DBP) in hypertension patients (Wang et al. 2010). Diaphragmatic breathing has demonstrated therapeutic effects on the physical and mental health of hypertension patients (Ma et al. 2017; Purwanto et al. 2022; Wang et al. 2010). While BE and HIIT have been widely used separately for hypertensive individuals, but no combined exercise modules have been found. Therefore, this study aimed to determine whether a combined module meets the aspects of accuracy, comfort and safety for individuals with hypertension.

MATERIALS AND METHODS

We utilised two approaches to develop the intended exercise module. First, the breathing exercise protocol was determined through a systematic scoping review. Due to the lack of evidence on HIIT using a bodyweight approach for adults with hypertension, the exercise movements for HIIT were determined by obtaining a consensus from experts in the relevant areas. The HIIT protocol was based on existing literature. Additionally, as a pilot study, this approach was tested on 10 hypertensive individuals to evaluate differences in mean blood pressure, heart rate (HR), cardiorespiratory fitness using the 6-minute walking test (SMWT), and muscle strength measured with a hand dynamometer before and after performing the exercises three times a week for ten weeks. This study was registered in The Thai Clinical Trials Registry (TCTR), identification number TCTR20230707003.

Breathing Exercise Protocol

The routine for breathing exercises was derived from prior studies. We conducted a scoping review by retrieving relevant articles from electronic databases namely PubMed, COCHRANE, and ScienceDirect. To ensure the inclusion of relevant publications, reference lists of reviews identified through the electronic search were also examined. Additionally, we explored several gray literature sources, including websites of regional, international and local organisations which were related to science or medicine. A literature search was conducted using the PCC framework, which stands for Population (hypertensive patients), Concept (breathing exercises), and Context

(global geographic target), to develop a search strategy. The research team created search terms using keywords, subject headings, and synonyms like "breathing exercises," "hypertension," "heart rate," and "quality of life" to capture all potential database resources. Each search result was documented, and data from the selected articles were carefully extracted to serve as the foundation for creating the exercise module (Herawati et al. 2023).

HIIT Protocol

Six experts in exercise and cardiorespiratory fields participated in the study as respondents. We employed the Delphi method to conduct surveys and gather expert feedback on specific topics. This technique organises group communication efficiently, enabling the group to address complex issues, especially when convening a panel is impractical due to time constraints or geographic distance. Several steps were involved in the design, validation, and analysis of data pertaining to HIIT workouts for hypertensive individuals. The first stage was creating a module based on an analysis of relevant literature. We selected 22 bodyweight training movements for HIIT from various references (Machado et al. 2019; Ruangthai 2019; Sperlich et al. 2017) and the authors' knowledge (Table S1). The second step was to validate the selected HIIT movements. A professional judgment was used to conduct the content validity test by consulting subject matter experts. Six experts evaluated whether the concepts, principles and approaches presented in the module were applicable to people with hypertension. These experts were chosen based on their knowledge, experience and professional opinion in the field. They included physicians, cardiorespiratory physiotherapists, sports physiotherapists and exercise physiologists with at least five years of experience. The experts were tasked with validating the exercise movements on a scale of 1 to 5 (1: Strongly disagree, 2: Not suitable, 3: Uncertain, 4: Agree, 5: Very suitable). An open-ended section was included for their remarks and additional practice suggestions. Responses were analysed using Aiken's V formula to determine the content-validity coefficient, with a V value of 0.79 and above being acceptable. Aiken's formula is as follows:

$V = \sum s / [n(c-1)]$
$s = r - lo$
lo = the lowest score of validity
c = highest validity rating score
r = numbers given by experts

Cronbach's Alpha values and Intraclass Correlation Coefficients (ICC) were calculated to determine the agreement between the experts. Upon completion of the statistical analysis, the final HIIT exercise module for adults with hypertension was finalised. The HIIT protocol was derived based on the latest systematic reviews available at that time (Costa et al. 2018; Leal et al. 2020).

Pilot Test

The completed program was piloted among hypertensive patients in the community health center area of Kartasura, Sukoharjo, Central Java, Indonesia. A total of 10 participants were selected using purposive sampling. Written informed consents were obtained from them prior to the pilot test. The inclusion criteria were as follows: (i) age >30 years; (ii) systolic blood pressure (SBP) >130 mm Hg and/or diastolic blood pressure (DBP) >80 mm Hg; (iii) no participation in any type of exercise training for at least 3 months prior to recruitment; (iv) readiness to exercise based on the PAR-Q questionnaire; and (v) body mass index (BMI)

between 18.5 and 24.99 kg/m[2]. The exclusion criteria included: (i) uncontrolled hypertension; (ii) chronic heart disease, diabetes failure, myocardial infarction, unstable angina or renal disease; (iii) orthopedic conditions affecting the ability to participate in exercise programs; (iv) treatment with steroids or hormones; (v) cancer chemotherapy; (vi) a history of exercise-induced asthma; and (vii) physical disability.

Participants attended training three times a week for 10 weeks, following the previously developed program. They were assessed at baseline and after completing the training. Outcome measures included: (i) systolic and diastolic blood pressure measured using an OMRON Automatic Blood Pressure Monitor HEM-8712 (Omron Corporation, Kyoto, Japan); (ii) HR measured using an OMRON Automatic Blood Pressure Monitor HEM-8712; (iii) cardiorespiratory fitness assessed by the Six-Minute Walking Test (SMWT); and (iv) muscle strength assessed by a CAMRY Dynamometer CAMRY EH101 (Sensun Weighing Apparatus Group Ltd, Guangdong, China).

Participants were asked and reminded to record any adverse events throughout the pilot study period. Collected data were analysed using SPSS (version 25). Paired t-tests were employed to determine the differences between baseline and post-intervention, with a significant level set at 0.05.

RESULTS

Breathing Exercise Protocol

Our scoping review revealed that most studies employed slow breathing techniques, typically at a rate of 6-10 breaths/minute, with durations ranging from 10 to 60 minutes/day (Sangthong et al. 2016; Wang et al. 2021). Based on these findings, we developed a slow and deep breathing exercise routine with a respiratory

In 4s	Out 6s	In 4s	Out 6s	In 4s	Out 6s	In 4s	Out 6s	In 4s	Out 6s	In 4s	Out 6s
10s normal breathing											
In 4s	Out 6s	In 4s	Out 6s	In 4s	Out 6s	In 4s	Out 6s	In 4s	Out 6s	In 4s	Out 6s
10s normal breathing											
In 4s	Out 6s	In 4s	Out 6s	In 4s	Out 6s	In 4s	Out 6s	In 4s	Out 6s	In 4s	Out 6s
10s normal breathing											
In 4s	Out 6s	In 4s	Out 6s	In 4s	Out 6s	In 4s	Out 6s	In 4s	Out 6s	In 4s	Out 6s
10s normal breathing											
In 4s	Out 6s	In 4s	Out 6s	In 4s	Out 6s	In 4s	Out 6s	In 4s	Out 6s	In 4s	Out 6s
10s normal breathing											
In 4s	Out 6s	In 4s	Out 6s	In 4s	Out 6s	In 4s	Out 6s	In 4s	Out 6s	In 4s	Out 6s
10s normal breathing											
In 4s	Out 6s	In 4s	Out 6s	In 4s	Out 6s	In 4s	Out 6s	In 4s	Out 6s	In 4s	Out 6s
10s normal breathing											
In 4s	Out 6s	In 4s	Out 6s	In 4s	Out 6s	In 4s	Out 6s	In 4s	Out 6s	In 4s	Out 6s

FIGURE 1: Breathing exercise protocol

rate of 6 breaths/minute (Figure 1). Participants performed these exercises three times a week for 15 minutes in the morning and evening under our direct supervision for 8 weeks. The breathing exercise (BE) was conducted as follows: (i) participants sat comfortably, relaxing their neck and shoulder muscles; (ii) they placed their right hand on the chest wall and the left hand over the navel; (iii) they inhaled deeply through the nose for 4 seconds, focusing on abdominal expansion while keeping the chest still; (iv) they exhaled gently through the mouth for 6 seconds; and (v) this cycle was repeated for up to 15 minutes, with a 1-minute rest period after every 10 breaths.

HIIT Protocol

- Validity

We conducted a content validation test for the HIIT module before its implementation. Using Aiken's V formula, we calculated the coefficient of content validity for each session (Table 1). With six raters and five categories, the minimum acceptable V value was 0.79, resulting in 14 accepted movements. Following expert panel suggestions, five movements (abdominal crunch, plank, bridge, superman and triceps dips) were excluded to maintain a consistent posture and ease transitions. One exercise requiring bench equipment (step-up) was also excluded (Table 1). The remaining eight movements were combined with warm-up and cool-down exercises to form a complete exercise module.

Reliability was assessed using Cronbach's Alpha, yielding a value of 0.780, indicating high agreement between raters (Cohen 1988). The interclass correlation coefficient further demonstrated strong reliability among the six raters, with an average agreement of 0.780 and

TABLE 1: Selection of body weight exercise movements by Aitken's validity and professional judgement

No	Movement	Aitken's V		Professional Judgement
		Coefficient	Decision	
1	High knee	0.958	Accepted	Accepted
2	Butt kicks	0.958	Accepted	Accepted
3	Lateral walk	0.958	Accepted	Accepted
4	Lunges	0.917	Accepted	Accepted
5	Side lunges	0.917	Accepted	Accepted
6	Jumping Jack	0.792	Accepted	Accepted
7	Squat	0.792	Accepted	Accepted
8	Split squat	0.792	Accepted	Accepted
9	Step up	0.792	Accepted	Not Accepted
10	Abdominal Crunch	0.792	Accepted	Not Accepted
11	Plank	0.792	Accepted	Not Accepted
12	Bridge	0.833	Accepted	Not Accepted
13	Superman	0.792	Accepted	Not Accepted
14	Triceps drips	0.792	Accepted	Not Accepted
15	Mountain climber	0.75	Not Accepted	Not Accepted
16	Jumping lunges	0.708	Not accepted	Not Accepted
17	Squat jacks	0.708	Not Accepted	Not Accepted
18	Push Up	0.708	Not Accepted	Not Accepted
19	Upper body crunch	0.708	Not Accepted	Not Accepted
20	Side crunch	0.667	Not Accepted	Not Accepted
21	Burpee	0.625	Not Accepted	Not Accepted
22	Side to side push up	0.583	Not Accepted	Not Accepted

a single-rater consistency of 0.307 (Table 2) (Landis & Koch 1977).

The HIIT protocol was informed by a systematic review comparing HIIT to moderate intensity continuous training (MICT), which included prehypertensive individuals. This review described intervention durations of 4-16 weeks with weekly exercise times of 51-200 minutes, high-intensity bouts at 75-95% of HRmax/peak and active recoveries at 45-70% of HRmax. The Borg rating of perceived exertion (RPE) scale was used to gauge exercise intensity, which is considered reliable when HR estimation is difficult due to conditions like arrhythmias or beta-blocker use (Zanettini et al. 2013). HIIT and MICT yielded similar reductions in systolic blood pressure, with HIIT showing a greater reduction in SBP and a better increase in VO2 max (Costa et al. 2018; Leal et al. 2020).

The HIIT protocol involved eight bodyweight exercises performed at high intensity (RPE 15-16) for 20 seconds, followed by low to moderate intensity (RPE 10-11) brisk walking and breathing exercises for 40 seconds in the first 2 weeks. In weeks 3-8, high-intensity exercises lasted 30 seconds with 30 seconds of moderate-intensity walking (Khammassi et al. 2018). Each session included three sets of exercises, with 5-minute warm-up and cool-down periods incorporating jogging, high knee, arm circles, arm swings, hip circles, hamstring stretches and quadriceps stretches.

Pilot Study

Participant recruitment began in March 2020 but was prolonged due to COVID-19 restrictions. All 10 participants completed the 10-week training, consisting of 3 males and 7 females with a mean age of 59.50 ± 4.01 years (52-65 years) and a BMI of 22.91 ± 1.33 kg/m^2 (21.08-24.61 kg/m^2). Significant reductions in mean SBP and DBP were observed post-intervention ($p = 0.001$ for both), along with significant improvements in HR ($p = 0.046$) and cardiorespiratory fitness (SMWT, $p = 0.002$). Muscle strength did not show a significant change ($p = 0.105$). No adverse events were reported during the training period. Participants characteristics and outcome measures were presented in Table 3.

DISCUSSION

HIIT has long been recognised as a beneficial alternative exercise for health. In this study, we adapted HIIT activities for hypertensive individuals by incorporating various workout motions and breathing exercises.

This research was conducted in two stages: the development of the exercise module and its validation by six qualified experts. Out of the 22 identified movements, eight were

TABLE 2: Intraclass Correlation Coefficient

	Intraclass Correlation	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.307[a]	.063	.772	4.544	5	35	.003
Average Measures	.780[c]	.350	.964	4.544	5	35	.003

[a] the estimator is the same whether the interaction effect is present or not; [c] this estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise

TABLE 3: Participant characteristics and outcome measures

Characteristic	Baseline	Post	p-value
Age (year)	59.50 ± 4.01	N/A	N/A
Men/Women	3/7	N/A	N/A
BMI (kg/m^2)	22.91 ± 1.33	N/A	N/A
Blood pressure			
Systolic (mmHg)	157.70 ± 8.60[a]	142.60 ± 14.69[a]	0.006
Diastolic (mmHg)	88.10 ± 7.82[a]	80.60 ± 10.39[a]	0.046
Heart Rate (bpm)	93.80 ± 5.31[a]	86.90 ± 6.77[a]	0.026
6-Minutes Walking Test	347.00 ± 56.58[b]	425.00 ± 68.84[b]	0.001
Muscle strength	19.28 ± 7.16	19.59 ± 7.07	0.570

[a]Baseline > Post; [b]Baseline < Post; N/A: Not available

excluded due to a validity coefficient of less than 0.79, derived from the Aiken's table with six panelists rating on a five-point Likert scale. Movements with a validity coefficient above this threshold were deemed suitable for hypertensive individuals. The side-to-side push-up exercise was excluded as it had the lowest validity coefficient (0.583) and was considered too strenuous for hypertensive patients.

Guilford's classification of validity ranges from very high (0.80 < rxy < 1.00) to very low (rxy < 0.20) (Guilford 1956). According to this classification, the side-to-side push-up had moderate content validity. Other exercises like abdominal crunches, planks, bridges, superman, and triceps dips, though having a validity coefficient of less than 0.79, were excluded due to their prone positions, which would complicate transitions to standing positions and require mats. The step-up movement was not selected as it required a bench.

Cronbach's Alpha, a measure of reliability ranging from 0 to 1, yielded a score of 0.780 for this instrument. Tavakol & Dennick (2011) suggest a minimum reliability value of 0.70, indicating high dependability when Cronbach's Alpha is above this threshold. Reliability between raters was tested using the intraclass correlation coefficient (ICC), suitable for more than two raters. The ICC analysis showed an average agreement of 0.780 between raters and a consistency of 0.307 for a single rater. According to Fleiss et al. (2003) an ICC value above 0.75 indicates very strong agreement, and a value between 0.40 and 0.75 indicates good agreement, confirming the strong reliability and consistency of the raters.

The combination of high-intensity circuit bodyweight training and breathing exercises offers a practical, low-cost alternative for hypertensive individuals. As Gray et al. (2016) noted, HIIT using the whole body as a resistive force is more practical than traditional HIIT requiring special equipment. These exercises can be performed indoors or outdoors, making them accessible to the general population. Breathing exercises can be done anytime and anywhere without special equipment. Participants should be informed about the intensity of the training using the RPE scale and advised to discontinue exercise if they experience breathlessness, chest pain or cold chills.

Recovery periods following HIIT can be

active or passive (Abderrahmane et al. 2013; Fujita et al. 2009). Fujita et al. (2009) found no strength differences between sprint sessions regardless of recovery type. However, active recovery led to improvements in VO2 max and HR were more effective at eliminating blood lactate, increasing oxygen consumption, and maintaining HR than passive recovery (Abderrahmane et el. 2013).

Breathing exercises have been shown to lower blood pressure (Meles et al. 2004). They enhance baroreflex sensitivity (BRS) and reduce sympathetic activity and chemoreflex activation through the autonomic nervous system (ANS) stimulation of baroreceptors during inhalation and exhalation (Fonkoue et al. 2018). Our pilot study corroborates these findings. After an 8-week intervention combining HIIT and breathing exercises, participants showed significant reductions in both systolic and diastolic blood pressures, along with improved heart rates and cardiorespiratory fitness levels. Notably, no adverse events were reported, indicating the safety of this combined exercise protocol.

This combined exercise approach offers a promising non-pharmacological treatment alternative for hypertensive adults and elderly patients, especially those with low medication adherence in primary care settings, as highlighted by Ramli et al. (2012) and Mutmainah & Rahmawati (2010).

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CONCLUSION

The ICC study findings demonstrated an average agreement among raters of 0.780, with a consistency of 0.307 for individual raters in the development of the HIIT and breathing workout module. This indicates excellent agreement and solid consistency among raters, as the ICC results exceeded the assessment threshold. For hypertensive individuals, HIIT involving bodyweight exercises proved effective, with eight types of movements showing a validity coefficient of 0.79 for reducing blood pressure. The combined protocol of HIIT and breathing exercises holds promise for implementation among people with hypertension.

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TABLE S1: The suggested HIIT movements for the validation by the experts

No	Movements	Muscles that work on
1	Jumping Jack	hip adductors, calves, hip abductors, shoulder abductors, shoulder adductors, core
2	Jumping lunges	quadriceps, hamstrings, gluteus maximus, vastus medialis oblique, hip flexors, calves
3	Squat	quadriceps, gluteus, adductor magnus (inner thigh), hamstring, erectors, abdominals and obliques, upper back and lats, calves
4	Squat jacks	quadriceps, hamstring, adductors, abductors, glutes
5	Push Up	chest muscles or pectoralis, shoulder or deltoid, back of your arm or triceps, abdominals, serratus anterior
6	Abdominal Crunch	rectus abdominis, external oblique, internal oblique
7	Burpee	hamstrings, quads, calves, rectus abdominis, oblique, pectoralis, triceps, deltoids
8	Mountain climber	deltoids, biceps, triceps, chest, obliques, abdominals, quads, hamstrings, hip abductors, gluteus
9	Side to side push up	chest, shoulder, triceps, abs
10	Plank	erector spinae, rectus abdominis, transverse abdominis, trapezius, rhomboids, rotator cuff, deltoideus, pectoralis, serratus anterior, gluteus max, quadriceps, gastrocnemius
11	High knee	quadriceps, hamstring, calves, gluteus, rectus abdominis adductors, abductors, shins
12	Lunges	quadriceps, hamstring, gluteus, calf muscles, abdominal muscles, back muscles
13	Side lunges	gluteus, hamstring, quads,
14	Step up	quadriceps, hamstrings, gluteus
15	Bridge	rectus abdominis, erector spinae, hamstring, adductor muscles, gluteus
16	Superman	gluteus, hamstrings, back muscles, upper traps
17	Upper body crunch	rectus abdominis, upper abs,
18	Side crunch	internal and external oblique, transverse abdominis
19	Butt kicks	hamstring, gluteus
20	Triceps drips	triceps, pectoralis major, trapezius, serratus anterior
21	Lateral walk	gluteus, hip abductors
22	Split squat	gluteus maximus, gluteus medius, gluteus minimus, hamstrings, quadriceps, calves, hip stabilizers