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Can Exercise be an Alternative Treatment Option for Depression

Walker Rogers

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By:

Walker Rogers, PA - S

Master's Advisor:

Kurt Devine MD

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Abstract

As most people know, exercise has always been beneficial for our overall health. No matter which exercise program it is, they all provide some sort of benefit. A growing problem has been depression as more and more people are being diagnosed. Since normally, most people would be prescribed SSRIs, I wanted to find out if there were alternative options. I sought to determine if exercise can be an alternative treatment option for depression. A comprehensive literature review was conducted using the websites PubMed, NCBI, Science Direct, & Academic Search Premier and using the search terms depression, anxiety, exercise, yoga, resistance training, cardiovascular training, and males vs females. Inclusion criteria were studies that had specific exercise programs for different groups and measured their depression or depressive symptoms. Exclusion criteria were studies that did not have a specific exercise program to their study or if the study was not measuring depressive symptoms. Specific exercise programs are a beneficial treatment option for depression. Cardiovascular exercise is the most useful in the treatment of depression. Other forms of exercise include yoga and aquatic exercise which also improve depression symptoms. Resistance training has been contradicting and cannot be proven as an alternative treatment option at this time. An implication for further work will be determining how these different forms of exercise work long-term in a younger population of individuals.

Introduction:

Depression is a common disorder that has been frequently diagnosed in individuals around the world. Since this disorder is being diagnosed more and more, I wanted to find a different approach to the treatment of depression. Depression today is treated with SSRIs like fluoxetine, paroxetine, sertraline, or other specific kinds. Depression can also be treated with Cognitive Behavioral Therapy or SNRIs. The purpose of my research was to determine if different types of exercise can be an alternative treatment for depression. I wanted to look at different types of exercise in case one is more beneficial than the other. Some of these exercises include cardiovascular training which involves running on a treadmill or the ground, walking, and bicycling. More examples of exercise include resistance training, yoga, tai chi, stretching, or aquatic exercise. I believe if we can find a way to incorporate more natural methods to treat disorders, then it will benefit our health a lot more.

My research question is, using different scales to measure depressive symptoms, what is the effect of different forms of exercise in patients diagnosed with depression? To answer this question, this literature review will first provide a brief historical review of the research and pathology of depression. The current literature surrounding depression will be presented, following the conclusion of the study and how the articles affirm or counteract my research. The layout of the paper will start with all my articles that dealt with any kind of cardiovascular exercise. After I will include resistance training, yoga, tai chi, and aquatic exercise articles. For each article, I will explain how the study was done including the number of participants, how long the study was, what the study was aimed to achieve, the different groups in the study, the results from the study, and the conclusions the authors made. Following the explanation of each article, I will discuss the limitations of the study and how each could have been improved. After

all the articles have been discussed, I will include the next steps from my research paper as well as the potential for future research or projects to find different results.

There are many different reasons why I chose this as my research topic. As someone who has individuals with depression in my family, it is a very difficult disease for not only the individual but others around them. I have family members who forget to take their scheduled medication or not be able to go to CBT because of a timing issue so I wanted to see if I could find an alternative treatment that makes it easier for them not to have these issues. A reason why I chose exercise was that I perform resistance training almost every day and it improves my mood every single time. Another reason why I chose exercise as an alternative method is that there are many different forms of exercise, and it is affordable. The different types of exercise are listed above, and my gym membership is only ten dollars a month. A third reason for choosing exercise is because it is a natural way to improve individuals' health. Instead of taking a different medication or some sort of essential oil, for example, exercise has been proven to improve overall health so why can it not be an alternative treatment for improving mood and decreasing depressive symptoms. I also wanted to determine if combining CBT with a physical exercise program will be an even better treatment option for depression compared to medication or exercise alone. My paper aims to prove that physical exercise can be an alternative treatment for individuals diagnosed with depression.

Methods:

A comprehensive literature review was conducted using the websites PubMed, NCBI, Science Direct, & Academic Search Premier and using the search terms depression, anxiety, exercise, yoga, resistance training, cardiovascular training, and males vs females. Inclusion criteria were studies that had specific exercise programs for different groups and measured their

depression or depressive symptoms. The research also included any specific demographic, gender, and age group. Most studies focused on the older population. Inclusive criteria also included patients with more than just one condition they were suffering from. Exclusion criteria were studies that did not have a specific exercise program to their study or if the study was not measuring depressive symptoms. This research did not include other mental health conditions other than depression and anxiety. The research focuses on depression and anxiety and how exercise can benefit patients and improve their depressive symptoms.

Review of the Literature:

Throughout my research, I wanted to find different exercises with patients to see how their depressive symptoms would change. The first study I found was from the author Meyer, J. D[1]. The purpose of this study was to determine how acute exercise intensity and depressed mood responses are related. There were four exercise groups experimented with, one control, and three exercise conditions, all on a bike. The three groups for exercise were light, medium, and hard or at exertion ratings of 11, 13, and 15. The participants were to maintain 60-70 rpm and adjust to resistance for the 30-minute exercise. After the participants completed their exercise, they would fill out a questionnaire called the Beck Depression Inventory-II (BDI-II). The BDI-II is a validated measure of assessing depression symptoms. Scores will range from 0-63 with 14-19 being mild, 20-28 being moderate, and 29+ as severe. Another questionnaire that the participants filled out was the Profile of Mood States (POMS). This assessed mood state and patients diagnosed with depression are around the score of 8.5. In this specific study, some of the participants were also taking an antidepressant. 14 participants were taking an SSRI while 10 were not. As for the results of the study, the BDI scores showed that participants were experiencing far worse depressive symptoms 2 weeks before the trial compared to during the

trial. Comparing the light to moderate to hard exercises, there was a significant difference in POMS score 10 minutes post-exercise. The results showed that hard intensity was most significant for decreasing mood. There was no significant effect on depressed moods when using the POMS scale after 30 minutes post-exercise. However, scores for all three exercises were significantly lower on the POMS scale compared to the resting group. The study concluded that there was an acute improvement in depressed mood after exercise but not influenced by if it was light, moderate, or hard intensity[1]. The study also concluded that POMS scores for participants on antidepressants showed lower scores than participants not on antidepressants[1].

With what I found that was more specific to cardiovascular training, I wanted to see how a different exercise program would affect depressive symptoms. The study by the authors of Levinger et al[2] was about resistance training improving depressive symptoms in patients with comorbidities such as Type 2 Diabetes of Cardiovascular Disease. The authors of this study used the Cardiac Depression Scale to measure aspects of depression in patients. The resistance training specific to the study had seven different exercises which included chest press, leg press, lateral pull-down, triceps pushdown, knee extension, seated row, and biceps curl. To measure training intensity, the study used the 1 repetition maximum method (1RM). The first week of the exercise program consisted of 2 sets of 15-20 repetitions at 40-50% of the 1RM. In weeks 2-10, participants performed 3 sets of 8-20 repetitions at 50-85% 1RM. The participants had to get 15-20 repetitions in week 2, 12-15 repetitions in weeks 3-6, and 8-12 repetitions in weeks 7-10[2]. Weight for each exercise depended on the individual and changed on a week-to-week basis. Participants were put into different groups which included Low-Risk factors for metabolic syndrome training (LoMFT), Low-Risk control (LoMFC), High-Risk factors for metabolic syndrome training (HiMFT), and High-Risk control (HiMFC). At baseline, there were no

significant depression score differences between LoMFC and LoMFT but the HiMFT group had higher depression scores compared to the HiMFC. Also, there were higher depression scores in the HiMFT group compared to the LoMFT. After the experiment was conducted, the HiMFT group had improved scores for depression by 14.8 points on the CDS which was a significant improvement compared to both the baseline and the HiMFC group. There was no significant change between the LoMFT and LoMFC groups. The study confirms the findings that resistance training may alleviate depressive symptoms in individuals at high risk for developing Type 2 Diabetes and CVD[2].

After studying both resistance and cardiovascular training, I wanted to learn about a different approach to exercise other than the basics. The study by authors Kwok JYY et al[3] wanted to determine the effects of yoga versus stretching with resistance training on patients with Parkinson's disease that have depression and anxiety. The study had three different groups to get different results from and they were a mindfulness yoga group (MY-PD), a stretching and resistance training exercise group (SRTE), and a control group. The participants in the mindfulness yoga group had a 90-minute session once a week for 8 weeks. The MY-PD had a regimen of 12 basic yoga poses that included sun salutations (60 minutes) with controlled breathing (15 minutes) and meditation (15 minutes). The second group of participants also had a trial of 8 weeks, where they performed a 60-minute exercise weekly. The training consisted of a set of warming up, resistance training, stretching, and cool-down exercises. For anxiety and depression, the symptoms were measured using the Hospital Anxiety and Depression Scale (HADS). Compared to the SRTE group, the MY-PD group showed significant improvement in anxiety and depression symptoms. The study discussed that the MY-PD group responded much better to improving symptoms compared to the SRTE group. The authors concluded that the

MY-PD group was considered statistically and clinically significant[3]. Compared to the Levinger et al[2] study, the resistance training group showed a slight improvement in anxiety and depression symptoms but a significant improvement in motor improvement. The participants improved their muscle tone and overall movement but could not see a significant improvement in depression or anxiety symptoms.

All the studies discussed so far have been outpatient, so the Imboden et al[4] study wanted to establish if adding on aerobic exercise or stretching to in-patients would improve their depression. The participants of the study had to take the Hamilton Depression Rating Scale (HDRS17) to measure their depression symptoms. There were two groups in the study, either the Aerobic Exercise (AE) group as well as the stretching or the control group. The AE group was to perform indoor bicycles three times a week for six weeks. The participants needed to reach a target heart rate of 60-75% of their maximum heart rate predicted by their age[4]. The exercise time frame was around 45 minutes a session and was classified as moderate exercise. The control group attended a stretching program where the participants were to not get out of breath as well as keep a low level of energy being used. All patients received standard inpatient treatment including pharmacological treatment, individual and group-based psychotherapy, and other therapies. The pharmacological treatments used were SSRIs, SNRIs, lithium, or quetiapine[4]. The short-term effects of the study showed symptom severity decreased significantly regardless of group allocation[4]. The AE group scores continued to decrease significantly from the beginning to the end of the study. The control group showed improvements after week 1 but kept on until after the study. For the long-term effects for the depressed patients, from the time frame of post-treatment to follow-up, there was high stability in the control group. According to the

HDRS17 score, both the exercise and control groups showed a significant decrease in symptoms for patients that are depressed[4].

Using many different exercise programs like being on a bicycle, resistance training, or yoga, I wanted to determine if another specific exercise program can improve depressive symptoms. The study by authors Silva et al[5] sought out if aquatic exercise has any effect on older adults' diagnoses of depression. The aquatic program was 12 weeks with 2 weekly sessions lasting around 45 minutes. Heart rate was monitored every 10 seconds and exertion was measured in the final 20 seconds of each stage. There were 9 exercises in every session, with each exercise having 4 sets of 30 seconds with 10-second intervals[5]. Patients were to answer the BDI-II after every session to determine their depressive symptoms. At baseline, there were no significant differences between groups. For depression scores, there was a significant decrease in scores after the aquatic exercise program for the depression group. There was a 53% decrease in scores for depressed elderly individuals[5]. For anxiety scores, there was also a significant decrease in the depression group. There was a 48% decrease in anxiety for the depressed elderly individuals[5]. The study also tested a time up and go test in which the times for the depressed group decreased substantially compared to baseline. A 4-second difference for depressed individuals. The authors of the study can conclude that low-intensity aerobic training in an aquatic environment is an effective treatment option for depressed elderly patients when trying to decrease their anxiety and depression[5]. Along with these scores, the patient's overall anatomical and physiological health improved as well.

Relating to the study by Meyer, J. D[1], the purpose of the study by Toups et al[6] was to determine the effects of aerobic exercise on patients with depression. The exercise treatment tested was either a high dose of 16 kcal/kg/week or a low dose of 4kcal/kg/week. Participants

met with exercise trainers to develop exercise plans meeting the prescribed dose using aerobic exercise. These aerobic exercises could include jogging, walking, or running on a treadmill. After the first two sessions in which the trainers assisted in making the exercise program, the participants were monitored once a week by the study and completed the remaining exercise at home. The participants used the SHAPS questionnaire to determine their depressive symptoms scores as well as the MEI score to determine their level of fatigue, energy level, physical activity, and general motivation. These subjects were given these questionnaires at 6- and 12-week intervals. The study discussed that participants that had anhedonia and lack of motivation and energy changed significantly over the exercise treatment for depression[6]. When there were changes in the MEI score, there was a direct correlation that improved depressive overall symptoms. There was an improvement in depression and that led to more social motivation at the 12-week point for both groups, however, the higher dose group benefited more. The study does conclude that exercise affects motivated behavior more than anhedonia measured by the SHAPS questionnaire[6]. However, both symptoms were improved by the exercise program, it was just motivated behavior that was the more improved symptom. When it came to the low MEI or mental energy score, the higher dose group showed to have a better outcome for symptom improvement. This study suggests that the higher dose group benefited more from improving overall depressive symptoms compared to the low dose group.

The studies presented already all show what exercise can do by itself in the treatment of depression. The study by Hallgren et al[7] used exercise and cognitive-based therapy (CBT) as treatment options for depressed individuals. The study was 12 weeks and the authors obtained assessments for depression at baseline and post-treatment which was 3 months after. The primary outcome was the severity of depression assessed by the Montgomery-Asberg Depression Rating

Scale (MADRS). The physical exercise group was randomized into the light (e.g., yoga), moderate (e.g., aerobics class), or vigorous (e.g., aerobics/strength training and balance class) exercise groups. Along with the exercise part of the trial, there was also internet CBT used for treatment. The ICBT was an online manual that was in the form of modules in which the participants answered questions. During the full trial, participants would log into a website around four times a week, send 18 messages to their therapists, and receive 17 messages[7]. The final group was the control group which received normal treatment for depression and included CBT counseling. There was a significant reduction in the level of depression in all three treatment groups. Along with that, the data indicated that the improvements for depression after three months were much larger in the physical exercise and ICBT groups[7]. No difference between the physical exercise and ICBT group's data as both decreased the level of depression by around the same amount. Mean MADRS scores were around 20.7-22.4 at baseline[7]. This showed that most participants were in the moderate depression category. After three months, the data showed a decrease and therefore classifying these participants as mild depression.

Most studies have focused on older adults and how they would react to exercise, the Nasstasia et al[8] study was about how depressed youths would respond to integrated motivational interviewing and exercise interventions. There were two groups in this study, one was the Immediate Intervention group while the other was the Control/delayed group. The trial was 36 weeks long and there were six measurements. One was at baseline, the second at mid-treatment (week 6), post-treatment (week 12), mid-treatment for control (week 18), follow-up for IM or post-treatment for control (week 24), and follow-up for control (week 36)[8]. To measure the depression severity, the study used the BDI-II. The study used other scales to measure behavior and depression symptoms which were the Automatic Thoughts Questionnaire, Dysfunctional

Attitude Scale, Behavioral Activation for Depression Scale, Depression Somatic Symptom Scale, and Physical Health Questionnaire[8]. The exercise intervention included small groups of 3-5, three times a week for 1 hour. The resistance training included leg press, shoulder press, bench press, plank holds, chin-ups, bench squats, kettlebell swings, and medicine ball slams. For the aerobic exercise, participants wore a heart rate monitor where they started at 70-80% HR and got up to 90% HR after several minutes. From baseline to post-treatment, the score in the BDI-II improved significantly in the intervention group. There were also significant improvements in the participants' cognitive and affective subscales[8]. The participants also had improvements in negative automatic thoughts in the intervention group. However, at the 24-week mark, the improvements were less marked than at the post-treatment reading. 60.1% of the intervention group no longer met diagnostic criteria for MDD in the post-treatment reading[8]. While only 3 participants in the control group no longer met the criteria showing a wide difference between the two groups. While the results showed improvement post-treatment was greatest, there were still improved symptoms at the 24-week reading. On every single scale used in the study, they all showed improvement in their depression and behavioral scores[8]. The authors state that exercise is effective not just in improving depressive symptoms but also in increasing their ability to participate in exercise.

Almost every study found was a short length of time, so I found a study that was nine months long that measured the effects of resistance training intervention on quality of life, sense of coherence, and depressive symptoms in older adults by authors Kekäläinen et al[9]. There were four randomized groups and had 26 people in the first group who worked out once a week, the second (27) twice a week, the third (28) three times a week, and the fourth (25) being the control group[9]. The resistance training consisted of warming up for 10 minutes followed by 9 minutes of

exercises for each muscle group. For the first 3 months, everyone together worked out twice a week before being split into their groups from months 4 to 9. The depressive symptoms were assessed using the BDI-II. The study showed positive results for improving depressive symptoms as well as the quality of life. There was an improvement in the training group for both quality of life and depressive symptoms, but the control group only improved on depressive symptoms during the 3-month time interval reading. The control group as well as the training groups all had improved symptoms from baseline to 9 months. However, only the training group that worked out twice a week from 4 to 9 months had a significant decrease in depressive symptoms compared to the other groups[9]. All other groups had remained the same or similar to their 3-month reading at the 9-month readings. Unlike other studies that measured resistance training, Kekäläinen et al[9] study found that working out twice a week for at least 9 months shows significant improvement in depressive symptoms. The Levinger et al[2], as well as Kwok JYY et al3 studies, showed a slight improvement in depressive symptoms with resistance training. These studies were both short term so if they expanded their studies to a longer duration, those two studies could have seen different results.

Late-life depression has been growing due to the baby boomer era getting to this age. The Belvederi et al[10] study had an objective to determine if physical exercise is a beneficial treatment option for late-life depression. The groups of the trial were the sertraline-only group, sertraline plus supervised nonprogressive exercise group (S+NPE), or sertraline plus supervised progressive aerobic exercise group (S+PAE)[10]. The S+NPE group consisted of supervised group exercise sessions three times a week for 24 weeks. The goal was for the participants in this group to not exceed a heart rate of 70%[10]. The S+PAE group had the same exercise schedule as the other group, but their exercise consisted of bicycles and more of a cardiopulmonary workout.

Assessments for the participants were given at baseline, 4 weeks, 8 weeks, 12 weeks, and 24 weeks. The assessment for these depressive scores was by the Hamilton Rating Scale for Depression (HRSD)[10]. The remission rate for depression showed as early as the 4-week mark in the two exercise groups at a higher rate than in the sertraline-only group. As the study continued and as there were more assessments, the S+PAE group showed the most improvement in remission for depression. The end of the study showed remission rates for all three groups. The sertraline-only group had a 45% remission rate, S+NPE was 73%, and S+PAE was 81%[10]. The S+PAE was at a constant decrease in depression scores while the sertraline-only group started very slow even at the 8-week mark. The HRSD had shown the greatest decrease in scores among the two exercise groups[10].

Compared to the Belvederi et al[10] study, the objective of the Blumenthal et al[11] study was to explore the anxiolytic effects of a 4-month randomized, placebo-controlled trial of exercise and antidepressant medication in patients with major depressive disorder[11]. However, in the Blumenthal et al[11] studies, sertraline does not get combined with the exercise groups like in the Belvederi et al[10] study. The patients selected were then put into 1 of 4 groups during a 16-week study. The groups were supervised aerobic exercise (SAE), home-based aerobic exercise (HAE), sertraline, or a placebo pill. The SAE group had to attend three 45-minute exercise groups a week and needed their heart rates to get in between 70-85%[11]. The HAE group had to exercise three times a week followed by the SAE group. The sertraline group met with a psychiatrist at weeks 2, 4, 8, 12, and 16. The placebo group met with a psychiatrist for 6 visits and had a titrated treatment daily. Spielberger State-Trait Anxiety Inventory-State (STAI) is being used to determine anxiety scores in these patients. Hamilton Depression Rating Scale (HAMD) also was used to assess MDD severity. Compared to the placebo group, the exercise groups had lower

scores on the STAI, and the sertraline group had around the same scores as the exercise groups. With the patients, there was a difference according to race. White patients had higher anxiety scores compared to black patients[11]. Now when assessing depression symptoms, the study found that no matter which active group the patients were in, they all had decreased depression scores. The findings were conclusive that the patients that had lower pre-treatment anxiety and depression scores also had lower scores post-treatment according to the HAMD[11]. Therefore, the study believes that exercise has a similar effect on the patients as sertraline had.

Older and younger adults have been the focus of the research so far, so I wanted to add a different population which is prenatal women with depression. The study by Field et al[12] wants to see the effects of Tai chi/yoga on prenatal depression and anxiety. The two groups of the study were the Tai chi/yoga group and a control group. In the Tai chi/yoga group, they participated in a 20-minute session per week for 12 weeks. These women were depressed pregnant women in their second or third trimester of pregnancy. The assessments were conducted at 22 weeks gestation at the beginning of the treatment period and 34 weeks gestation at the end of the treatment period[12]. All participants were given the center for epidemiological studies depression scale (CES-D) before and after treatment and which measured the frequency of the depressive symptoms over the week[12]. They were also given the state anxiety inventory (STAI) to assess their anxiety before and after treatment. The Tai chi/yoga group showed a significant decrease in depression and anxiety symptoms from baseline to the last day of the trial. Scores averaged 32.4 for depression at baseline and dropped to 23.5 on the last day[12]. A similar drop was seen with anxiety in this group. The control group also showed a drop from first to last day however, this was not a significant enough decrease to mean anything as it was not a large enough drop in scores. The authors believe that increasing their vagal activity could account for the effects

seen[12]. Heart rate or vagal activity increased from baseline by 64% in the 20th-week gestation reading and 150% in the 36th-week reading for the yoga group[12]. This decreases the stress of the pregnant mother which in turn would decrease the level of depression and anxiety as well.

Similar to the Field et al[12] study, the Taso et al[13] study also wanted to determine if yoga will improve depression and anxiety in women with breast cancer instead of being pregnant. The yoga group would do a 60-minute program that included warm-up, Anusara yoga, gentle stretching, and relaxation exercises[13]. The program would be twice a week during the chemotherapy treatment period over a total of 8 weeks. The Profile of Mood State questionnaire was used to assess the depression and anxiety moods of these patients during the study. The results from the study show the yoga group had a very large decrease in fatigue levels while the control group did change, but instead had increased levels of fatigue[13]. The study also found that the participants in the yoga group of the study had decreased depression and anxiety. Although, it cannot be clear whether this was due to yoga. The authors speak about several reasons why they failed to find the effect of yoga on depression and anxiety. The scores at baseline for depression and anxiety were very low, to begin with so it was difficult to see improvements in such a little time of the study[13]. They also believe the type of yoga performed would not help as much as specific other types[13]. The results indicate that depression scores were not significant enough to determine yoga as an effective treatment for depression.

Along with all the exercises addressed so far, the authors Suh et al[14] performed a study that dealt with lumbar stabilization and walking in patients with chronic back pain and depression. There were four groups in the study which were flexibility exercise (FE), walking exercise (WE), stabilization exercise (SE), and stabilization with walking exercise groups (SWE). Participants went through each exercise for 30-60 minutes, 5 times a week for 6 weeks[14].

The FE group went through stretching exercises for the abdominal muscle, quadriceps, hamstring, tensor fascia lata, piriformis muscle, and quadratus lumborum muscles for 30 minutes[14]. The WE group walked on flat ground for 30 minutes. The SWE group performed IGES for 30 minutes and walked for an additional 30 minutes. For the depression aspect of this study, the participants were given the BDI-II. The study performed assessments on the patients 2 weeks after the completion of the study. The second evaluation was 12 weeks after the completion of the study. For the flexibility exercise group, there was a drop in scores showing depression symptoms to improve. However, this group had the least amount of improvement out of all the groups. The walking and stabilization exercise groups had very similar results with an improvement in depressive symptoms even though the SE group had a lower BDI-II score at baseline[14]. The SWE group had the greatest improvement in depressive scores however this could be likely due to having the highest initial depressive scores compared to the other three groups in the study. There was no significant difference between the four groups overall, but all groups had significantly improved their scores[14]. Although statistically insignificant, the SE and WE groups showed more continuous improvement in LBP during rest and physical activity than the FE group[14]. The study would recommend that a patient suffering from chronic back pain and depression, then they should be given walking and stabilization exercise programs.

Compared to other studies that deal with older adults, the study by López-Torres et al[15] focused on adults older than 65 with depression. The study tested the effectiveness of physical activity being a replacement for antidepressant medication[15]. To be a part of this study, patients needed to meet the criteria of a “clinically significant” depressive state. The patients were monitored for 6 months with data being collected at baseline, 15 days, 1, 3, and 6 months. There were two groups in this study, a physical activity group, and a control group. The exercise

program consisted of two 1 hour sessions per week for 6 months. This included aerobic exercises (in which the goal was for subjects to perform 30 minutes of aerobic activity that was of moderate-intensity five days per week), muscle strengthening exercises (goal was two times a week), flexibility exercises (goal was two times a week for 10 minutes), and balance strengthening exercises (goal was three times per week)[15]. Depressive symptoms were measured using the Montgomery-Asberg Depression Rating Scale (MADRS) and the Geriatric Depression Scale (GDS). The results showed that there were improvements in the patient's depressive symptoms at every reading as well as their overall health. The control group did not have significant data for improving depressive symptoms. Both scales used to measure depressive symptoms showed improvements in the aerobic exercise groups. There was the largest improvement from the one to three months reading, possibly suggesting that the older adults were finally feeling comfortable with their program and it becoming part of their daily routine[15].

Throughout all the research articles and studies that I could find, most tend to agree with one another in the sense that exercise can significantly improve depression. This is seen with aerobic exercise in studies by Meyer, J. D[1], Imboden et al[4], Toups et al[6], Hallgren et al[7], Kekäläinen et al[9], Belvederi et al[10], Blumenthal et al[11], and López-Torres et al[15]. All these studies indicate similar results in which they improved depression symptoms in patients with depression. Resistance training did not show as much promise as aerobic exercise as it produced small improvements to depressive symptoms but nothing too clinically significant. The studies Levinger et al[2], Kwok JYY et al[3], and Kekäläinen et al[9] all showed these results. The one resistance training study that showed significant results was the Nasstasia et al[8] study. Yoga showed to be very beneficial in patients with depression as scores reflected that as well. The studies by Kwok JYY et al[3], Hallgren et al[7], and Field et al[12], all showed these positive results.

The study by Taso et al[13] did not show similar results but instead could not credit yoga as the reason for the depressive scores decrease. The aquatic exercise showed to be very beneficial in decreasing depressive symptoms as seen in the study by Silva et al[5]. All cases can be made for exercise being an effective treatment except for resistance training. Resistance training had some counteracting information that I will discuss later.

Discussion:

The purpose of this research paper was to find out if exercise can be an effective alternative treatment option for patients diagnosed with depression. The studies provided can confirm that exercise is an effective alternative treatment option for depressed patients. The most effective option for depressed patients if they had to try an exercise program out would be cardiovascular exercise. I say this because not only do all the studies agree and have the same results but also because they can be the most accessible. The studies Meyer, J. D[1], Imboden, et al[4], Toups et al[6], Hallgren et al[7], Kekäläinen et al[9], Belvederi et al[10], Blumenthal et al[11], and López-Torres et al[15] all demonstrate that cardiovascular exercise is beneficial for patients with depression. This can range from a bicycle, to running outside or on a treadmill, to even walking. Specific to the first study by Meyer, J. D[1], the study showed no matter the intensity of exercise, there was an improvement in depressive symptoms. Light, moderate, and hard intensities were on a bicycle, and they all showed improvement around the same amount. Another study by Belvederi et al[10] talked about the remission rates of depressed individuals and no other study seemed to mention it. This study used a combination of SSRIs with exercise programs to see how patients would respond. The three groups were a sertraline-only group, sertraline plus supervised nonprogressive exercise group (S+NPE), or sertraline plus supervised progressive aerobic exercise group (S+PAE)[10]. The results showed that the sertraline plus the aerobic

exercise group had the best results by far. They produced a remission rate of 81% of the entire group. No other study seemed to produce such extreme results as this study did. But it follows with the rest of the cardiovascular exercise studies in that they all improved depressive symptoms in these depressed patients. My only limitations for all the studies I have found were the sample size not being more than 60 participants most of the time and that the studies were only a couple of months in length. From carefully analyzing these studies, I have found that exercise is a great option short term, however, since these studies are only a couple of months in nature, the question remains are they a great option long term.

One study, in particular, was a nine-month study that did not have anything to do with cardiovascular exercise but resistance training instead. The study by authors Kekäläinen et al[9] wanted to measure the effects of resistance training long-term in depressed older adults. The study split participants up into four groups and the group was a control, working out once a week, twice a week, and three times a week. Specific to improving depressive symptoms, the most significant finding was from the group that worked out twice a week for nine months. I believe that the authors found a good balance between workout sessions and the specific age group tested. Since it was an older adult population in this study, twice a week for strenuous exercise seemed to be the perfect amount with one time a week being too little and three times a week is too much. The problem however is that the information was counteractive to other resistance training studies. The studies by Levinger et al[2] and Kwok JYY et al[3] showed positive results in improving depressive symptoms however, the results were minor and not significant enough to be called an alternative treatment method. These two studies were much shorter in time studied compared to the nine-month trial. This could be a factor as to why the results are so much different. Another reason could be that some people do not respond to lifting heavy

weights the same as other people. Take for instance myself compared to my sister. I most likely would respond great to a resistance training program because it brings me joy doing something like that as my sister would not respond well to that program. There are a lot of factors that could have contributed to different results so more testing needs to be done on resistance training.

The last two exercises that were studied were yoga and aquatic exercise. Both specific exercises showed significant improvements in depressive scores in all but one study. The significance of yoga is that it is easily accessible and can be done right at home. In the studies by Kwok JYY et al[3], Hallgren et al[7], and Field et al[12], the conclusions were made that yoga significantly improves scores of depression and even outperformed other exercise programs in some of the studies. Yoga has been concluded to be very beneficial for treating stress which would in turn help with depression and anxiety as well. However, this is not always the case because, in the study by Taso et al[13], the depressive scores were improved but the authors could not conclude that it was because of yoga. They believed that the depressive scores were too low, and the patients had very mild depression, to begin with, so the study had a limitation that was possibly too large to overcome. The aquatic exercise showed exciting results as depression and anxiety scores dropped significantly. The study showed a decrease of 53% in depression scores and 48% in anxiety scores in depressed elderly participants[5]. Aquatic exercise can be a beneficial treatment option for the elderly as they are a prime population of arthritis. If someone has arthritis, it is difficult for them to work out because it puts so much stress on the joints. Although aquatic exercise does not put any stress on the joints, making it a susceptible exercise program for these individuals.

A quick point can be made on what specific scale studies were used to determine depressive symptoms and how they got better or worse. Most studies were using the Beck

Depression Intervention (BDI-II) to determine depression scores. Other studies used different scales like the Cardiac Depression Scale, Hospital Anxiety and Depression Scale (HADS), Hamilton Depression Rating Scale (HDRS17), SHAPS questionnaire, or Montgomery-Asberg Depression Rating Scale (MADRS). I would have liked to limit the scales to just one or two however, there was not enough research to just limit the scales to one or two. This could be a limitation in determining if exercise is an alternative treatment option for depression as the scales could be different. The results could have been different if the studies used another scale instead. There were not enough research articles on exercise and depression that all had used the same scale for measuring depression.

Conclusion:

The purpose of this study was to answer the question, using different scales to measure depressive symptoms, what is the effect of different forms of exercise in patients diagnosed with depression? From what I have found specific to all the different forms of exercise out there, we have options. I believe the most beneficial and money-saving program of exercise is going to be cardiovascular exercise. This can be riding a bike, running, walking, or many other options. All studies point to depressive scores improving at a significant rate and even causing remission in some patients. It is also available to everyone just by going outside or to a facility nearby. It can be as little as walking a mile at a pace faster than normal. The benefits have been proven in every study listed in this research paper. Another option that is a useful treatment is aquatic exercise, especially in the older population that could be suffering from arthritis. Aquatic exercise is less attainable due to finding a pool around you, however, the remission rates have been very promising for individuals. Along with aquatic exercise, yoga has shown promising results as well. Many different patient populations have been tested using yoga and all have shown positive

results in decreasing depression symptoms. It can be done at home or a facility, facilities are more expensive of course so at home is always the better option financially. Now I believe resistance training is not for everyone, but more for a younger population of individuals. Individuals related to sports are where I would recommend resistance training for depressed individuals. However, there is not enough research to distinguish if resistance training is a treatment option as studies are contradicting one another. I believe more studies need to be made on younger populations as well because the diagnosis of depression has been growing lately, and most studies target the older generation. From my research I can conclude that exercise is an alternative treatment option for individuals dealing with depression.

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Can Different Forms of Exercise be an Alternative Treatment for Depression Long Term

Introduction

Depression is a common disorder that has been frequently diagnosed in individuals around the world. Since this disorder is being diagnosed more and more, I wanted to find a different approach to the treatment of depression. Depression today is treated with SSRIs like fluoxetine, paroxetine, sertraline, or other specific kinds. Depression can also be treated with Cognitive Behavioral Therapy or SNRIs. The purpose of my research is to determine if different types of exercise can be an alternative treatment for depression. I wanted to look at different types of exercise in case one is more beneficial than the other. Some of these exercises include cardiovascular training which involves running on a treadmill or on the ground, walking, and bicycling. More examples of exercise include resistance training, yoga, tai chi, stretching, or aquatic exercise. The purpose of my research proposal is to determine the long-term effects of different forms of exercise on patients with depression.

Research Design

The original trials and studies all used a specific workout regime to determine if it would benefit patients with depression short term. All the studies found that exercise did benefit depressed patients' short term. The research design will be for twelve months to determine the long-term effects of exercise on depressed patients. We will be using different posts and be in person at different locations including Augsburg University and other sites. We will be contacting local hospitals and other sites asking to give out questionnaires to patients with depression to see if they are willing to participate in a treatment trial. If the patients say yes, we will be in contact with them. Patients will need to be willing to allow us to have access to their

medical records to see that they are diagnosed with depression. The goal is to have 200 participants willing to participate in the trial.

The questionnaires will likely take about 5 minutes with contact information and willingness to participate in the trial. I believe this will take about a month to get to the goal of 200 willing participants. Once the 200 participants have completed their questionnaires and have been given access to their medical information, then we will begin randomization into different exercise groups.

Participants

To be eligible for this study, participants not only need to be diagnosed with depression but also need to be physically able to participate in rigorous exercise programs. Now, this does not mean the exercise programs are going to be the hardest thing they do, but it will challenge them and increase their heart rate. To spread the word about our trial, we will be going to different hospitals and sites and asking providers to give out questionnaires to patients that are clinically diagnosed with depression. The criteria for this study are as follows: must be diagnosed with depression clinically, must be physically able to perform exercise that could be rigorous, and must be in the age group 18-50 years old. The participants will be given a description of the study, whether they are placed in one group or another, as well as contact information if they have any questions or concerns. They will also be informed that their names or descriptions of the participants will not be used in any portion of the paper or study. Their reward for sticking with the program will be becoming physically healthier and hopefully finding them a new hobby.

There will be no mental or psychological toll on the patients but may cause minor physical tolls if the patients have never worked out before. During the first couple of sessions,

they may be sore but after, their bodies will get used to the exercise regimen. They will be told when to come into each session which will be three times a week. We will have the patients fill out a survey before their workout, workout for 45 minutes, and then do the survey again at the end of the session. This will be a continuous process for one year.

Methods and Data Collection

If the patients were to deny access to medical records from the entrant surveys, then their surveys will not be used for the study. We will be using a spreadsheet to organize all the patients in our trial. The patients will be randomized into different groups which include aerobic exercise on a bike, aquatic, resistance training, yoga, and a control group which just stretches. 40 patients will be randomized into each group without knowing other groups are participating in the trial. The site for which the exercise will take place will be determined once we have enough patients for the trial. Before and after the exercise training, the patients will be filling out two surveys which will take about 5 minutes each just to see their depressive symptoms. The surveys are called Beck Depression Scale II (BDI-II) and Hamilton Depression Rating Scale (HDRS17). At the end of the 12-month program, we will also be handing out an additional survey that will be asking what we could improve from the study and if they have any additional comments about their year of experience.

Patients are willing to leave the trial at any point and do not need to continue with the study if they do not want to. However, it is not recommended as it could change the data collection for each group. The data will not be shown to anyone at all until the end of the trial to make sure there is not any bias that changes our results.

Statistical Analysis

An excel spreadsheet will be created to record all responses before the trial and we will also randomize all the patients into different groups. We will have to look at the medical records of all the patients willing to participate in the trial to confirm they have been diagnosed with depression. All recorded responses from the two surveys given out before and after the workout regimen will be on an excel spreadsheet and no one will have access to the results until after the study has been completed. In each of the groups, we will try to make the gender difference as similar as possible between the five different groups being tested.

Once we have enough patients for the five groups in the trial, we will calculate the average age of the patients, sex, when diagnosed, and other things. To make sure that everything is clinically significant, we will be using a P-value standardized scale. This will be calculated in the excel spreadsheet. There will be an optional survey at the end of the trial to help improve the trial if we helped them develop a new hobby, and other questions significant to the study.

Challenges of the study

There will be a couple of challenges when it comes to the study. One will be getting enough responses to have the correct number of participants for the trial. 200 patients is quite a lot but hopefully, people would want to join the study to help themselves out. I believe if we receive help from other physicians and have them try to convince their patients that this could be very beneficial, then we will not run into this challenge as much. Another challenge is the time frame of the study. One year is a lot of time and commitment for an individual to stick with. We tried to make it where we would only need an hour and a half at the maximum only three times a week. But multiple factors will play into it as they could come down with a sickness, move away, have some sort of accident, or other things. If we can have committed patients willing to stick with the trial and not have any setbacks, then this challenge is also very easily avoidable. Finally,

one other challenge that may happen is the possibility of patients not participating because there isn't a true reward other than getting into better physical shape and hopefully decreasing depressive symptoms. If I were to have the funds, I would give a small financial reward to hopefully draw in more participants, however, this is not possible.

Conclusion

The purpose of the study is to help find a more therapeutic and natural treatment option for depressed patients other than medications. Exercise has shown to already be a beneficial option for depressed individuals acutely, however the research has not gone to the extent of long-term treatment. The goal is to prove that exercise is not only an acute treatment for depression but a long-term treatment option as well. Now when we say exercise, this is a broad term. That is why this study will break down the different types of exercise for depressed individuals to see if one type of exercise regimen is more beneficial than another. Depression is the second most common diagnosis in the world today, and it will continue to be unless we can improve treatment options.

An alternate outcome we possibly could see with this study is the benefit of exercise on the patient's overall health. The study does not exclude patients with comorbidities so if a patient were to have a comorbidity, we could see an improvement in their overall health. I believe we will see a boost in patients' overall health and predict their comorbidities to also improve if they were to participate in the study. Exercise such as cardiovascular training has already been proven to improve comorbidities such as hyperlipidemia, diabetes, and many others. This study predicts that it can do the same for patients diagnosed with depression.

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