EFFECT OF PROGRESSIVE MUSCLE RELAXATION TECHNIQUES TO BLOOD GLUCOSE LEVELS ON PATIENTS WITH TYPE 2 DIABETES MELITUS; SYSTEMATIC REVIEW

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Abstract: Introduction: Type 2 DM is one of the most common chronic diseases that cause death and disability worldwide. Type 2 diabetes has a major impact on society and the health system. People with type 2 diabetes during the year will experience physical and psychological disorders that can increase stress. Stress that occurs will increase the secretion of adrenal hormone and cortisol hormone resulting in increased glucose. Progressive Muscle Relaxation (PMR) is a relaxation technique involving breathing and muscle stretching. This technique is proven to relieve stress. Patients learn to tighten and relax muscles regularly, thus reducing stress and affecting the decrease in glucose. Objective: This systematic review to determine the effect of Progressive Muscle Relaxation technique on the reduction of blood glucose in patients with type 2 diabetes mellitus. Method: Source search using Database: Scopus, Proquest, Science Direct, PubMed and Sage limited in 2012 - 2017. Obtained 15 journals that fit the criteria. Results: Based on the review conducted, the systematic review of articles or journals states that Progressive Muscle Relaxation can lower blood glucose levels in patients with type 2 diabetes mellitus. Conclusion: Progressive Muscle Relaxation interventions influence the decrease in blood sugar levels in patients with diabetes mellitus.

1 BACKGROUND

Diabetes mellitus is a chronic disease characterized by blood sugar levels due to either a lack of insulin or resistance to insulin. Approximately 230 million people in the worldwide suffer from diabetes in 2010. The global figure of people with diabetes is projected to increase to 333 million on 2025, and 430 million on 2030. As prevalence of diabetes have increased to a epidemic in the worldwide, vascular complications, Nowadays Diabetes has become one of the most challenging health problems. A relatively small proportion (10%) of patients who suffer from diabetes mellitus have type 1 diabetes or insulin dependent. However, majority of diabetics are dependent on insulin and capable, at least initially, to produce the hormone. This type of diabetes mellitus (diabetes mellitus) is called type 2 diabetes (Rochette et al., 2014)

A person who has suffered from diabetes mellitus is more than a year will experience physical and psychological disorders. This physical and psychological disruption will cause stress. Stress in patients with diabetes mellitus include heavy stress because stress will be experienced lifetime. Stress will activate the secretion of hormones adrenaline and cortisol. The hormone adrenaline causes the release of glycogen in the liver into sugar and the hormone cortisol antagonist to insulin release. Secretion of hormones adrenaline and cortisol hormone causes increased sugar in the blood vessels so that there hyperglycemia (Rochette et al., 2014).

Control of Diabetes Mellitus are well demonstrated with a normal fasting blood glucose level is 80-125 mg / dL. Physical exercise can keep fit, lose weight and improve insulin sensitivity, so it will improve the control of blood sugar. In addition to physical exercise, relaxation is effective in increasing the absorption of insulin and improves circulation leading to a drop in blood sugar levels (Rochette et al., 2014).

Various nursing actions have been carried out and developed and applied to the patient, one with progressive muscle relaxation (PMR). Based on the
background of the purpose of this study was to determine the effectiveness of physical exercises and progressive muscle relaxation (PMR) to decrease fasting blood sugar levels in people with Type 2 diabetes.

2 METHOD

The scope of the literature is the use of either a combination or single technique relaxation intervention. The use of relaxation techniques in question is via inhalation and topical. Aromatherapy is used to clients who suffer from Diabetes Mellitus. Literature studied is speaking English, Chinese and Spanish in order to multiply the amount of literature. The database used in the literature search was Scopus, Proquest, ScienceDirect, PubMed by limiting keyword "Relaxation" AND "Diabetes Mellitus" the search is performed with a limit of an article in 2012-2016. Additional sources used are Sage Journal.

Scopus (n = 9)  ScieneDirect (n = 10)  SageJournals (n = 3)

Proquest (n = 10)  PubMed (n = 7)

Database Record (n = 39)

Record Excluded
3 journals irrelevant
1 journal in Chinese
2 Spanish language journal

Studied included (n = 6)

Figure 1: PICOT strategy and Boolelan logic source search on electronic database

Data extraction and appraisal

Data Extraction designed using the primary criteria of the framework Greenhalgh. Components that are taken are of interest, the design of the study population (sample size, characteristics and methods of recruitment), interventions such as relaxation techniques, the outcome measures, method of data collection, and analysis of results. Criteria of article which is related to the quality and validity were evaluated with a focus on the sample size, allocation of clients and needs and factor biias. Data extraction is done by one reviewer and checked by a second reviewer.

3 RESULT

Articles research found as many as five journals published from 2012 up to 2016. The research conducted in various countries with diverse methods. The research method which was found in the study is a randomized controlled clinical trial (n = 3), Quasi-randomized (n = 1), Prospective and cross sectional features (n = 1), Prospective randomized control study (n = 1), Quasi-experimental alone group pretest-posttest design (n = 1), parallel group randomized controlled study (n = 1), and Single group pre-post design (N = 1). The
study design the most widely used is the Randomized Controlled Trial with the highest number of samples are 124 respondents.

Relaxation techniques are non-pharmaceutical interventions are well used to solve problems in patients with Diabetes Mellitus. Relaxation techniques which are used in the study as the intervention is Progressive Muscle Relaxation (PMR). But some techniques Progressive Muscle Relaxation (PMR) in combining music and education.

The most effective method is the provision of progressive muscle relaxation action is combined with massages administration, education and relaxation therapy by using CD is the largest and significant intervention was successful in providing therapy to clients. Intervention which is conducted by these researchers can reduce blood sugar levels in patients with diabetes mellitus.

Table 1. Analysis of Instruments Progressive Muscle Relaxation (PMR)

<table>
<thead>
<tr>
<th>components instruments</th>
<th>PMR</th>
</tr>
</thead>
<tbody>
<tr>
<td>stretching muscles</td>
<td>Deep Breathing</td>
</tr>
<tr>
<td>HbA1c</td>
<td>√</td>
</tr>
<tr>
<td>HRQOL</td>
<td>√</td>
</tr>
<tr>
<td>NES</td>
<td>√</td>
</tr>
<tr>
<td>Stress management</td>
<td>√</td>
</tr>
<tr>
<td>Decreased Glucose</td>
<td>√</td>
</tr>
<tr>
<td>Score grading</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 1 shows the results of that intervention Relaxation can lower blood glucose. Chronic stress tends to make people happy with sweet foods to boost brain serotonin levels of fat, which has a calming effect while to relieve the stress. But glucose and fat is dangerous for those who are at risk of diabetes mellitus. Stress can increase blood glucose content because stress stimulates the endocrine organ to issue epinephrine, epinephrine has a very strong effect in causing glykoneogenesis process in the liver, so it will release large amounts of glucose into the bloodstream in a few minutes. This is causing an increase in blood glucose levels when stress or strain. Some things that cause blood sugar to rise, ie lack of exercise, increasing the amount of food consumed, increasing stress and emotional factors, weight gain and age, as well as the effects of drug treatments, such as steroids. Sedentary lifestyle is associated with an increased risk for high blood sugar and diabetes. In people with diabetes, exercise reduces blood sugar levels. Exercise also reduces cardiovascular complications due to diabetes, including high blood pressure, heart disease, and inflammation. One technique that has proven coping effectively cope with stress disorders, namely relaxation. Relaxation techniques can reduce blood sugar levels in patients with stress reduction.

Table 2. PICOT

<table>
<thead>
<tr>
<th>No</th>
<th>Title</th>
<th>Population</th>
<th>Study Design</th>
<th>Intervention</th>
<th>Comparison</th>
<th>Outcome</th>
<th>Time</th>
</tr>
</thead>
</table>
| 1  | The effect of progressive muscle relaxation on glycated hemoglobin and health-related quality of life in Patients with type 2 diabetes mellitus. (Tahereh Naja fi Ghezeljeh, et al, 2016) | 65 patients with diabetes mellitus in Firoozgar Hospital, Tehran, Iran | randomized controlled clinical trial | PMR training Jacobson with 3 stages:
1. Explaining breathing techniques and stretching techniques and muscle toning.
2. Patients perform the appropriate procedure
3. Providing education, pamphlets and CD training | Patient group received only conventional pembandng care. | There is no significant difference in terms of HbA1c levels and HRQOL scores between the two PMR groups and the control group 12 weeks after the intervention. However, in the PMR group, the intervention caused a significant reduction in HbA1c levels and an increase in the total score and psychosocial HRQOL significantly. PMR does not have a | 12 weeks |
<table>
<thead>
<tr>
<th>No</th>
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<th>Outcome</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Implementation of a stress management program in outpatients with type 2 diabetes mellitus. (Efio Kolovero, et al, 2014)</td>
<td>53 patients with Type 2 Diabetes Mellitus</td>
<td>Parallel group, randomized controlled trial</td>
<td>(PMR engineering measures)</td>
<td>glycemic control</td>
<td>Application of simple techniques as RB-PMR, at low cost, does not require a long time and is highly considered as an additional non-pharmaceutical treatments are cost-effective for patients with type 2 diabetes.</td>
<td>8 weeks</td>
</tr>
<tr>
<td>3</td>
<td>Education, progressive muscle relaxation therapy, and exercise for the treatment of night eating syndrome (Jill on S. Vander Wal, et al, 2015)</td>
<td>A total of 44 participants with SEN 2</td>
<td>Randomized controlled clinical trial</td>
<td>1. Provide information on research objectives and provide written approval questionnaire 2. Ask the patient to practice diaphragmatic breathing techniques and PMR 4. Sharing the training CD (steps diaphragmatic breathing techniques and PMR) 5. Ask the patient at home melanaksanemba li 6. Evaluating the results of the patient over the phone</td>
<td>Glycemic control</td>
<td>Night eating syndrome (NES) is a circadian rhythm disorder in which food intake is shifted into the middle of the night, and can disturb sleep. Model biobehavioral NES said the results of a genetic predisposition, coupled with stress, causing an increase in the reuptake of serotonin, thereby dampen the circadian rhythm and reduced satiety. Biobehavioral using the model as a guide, we developed a brief behavioral intervention, consisting of information about SEN, healthy eating, and the importance of sleep and hygiene, coupled with exercise and use of</td>
<td>1-3 weeks</td>
</tr>
<tr>
<td>No</td>
<td>Title</td>
<td>Population</td>
<td>Study Design</td>
<td>Intervention</td>
<td>Comparison</td>
<td>Outcome</td>
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<td>4</td>
<td>Measuring possible effect on health-related quality of life by tactile massage or relaxation in Patients with type 2 diabetes (Per E. Wandell, et al, 2012)</td>
<td>A total of 44 participants with Type 2 Diabetes Mellitus patients</td>
<td>Quasi-randomized, parallel group</td>
<td>1. Providing a CD of relaxation techniques and soft music Patients demonstrating tactics or relaxation massage techniques in accordance with the guidelines CD</td>
<td>Oral anti-diabetic treatment</td>
<td>Mechanical stress reliever with CD TM or limited relaxation showed no major effect on patients with diabetes mellitus type 2, however, in the group of patients with higher perceived stress may show a benefit with this type of non-pharmaceutical treatment</td>
<td>10 weeks</td>
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<td>5</td>
<td>Relaxation Response induces transcriptome Temporal Changes in Energy Metabolism, Insulin secretion and Inflammatory Pathways (Manoj K. Bhasin, et al, 2014)</td>
<td>A total of 52 participants who are already getting exercise RR and who do not get the exercise RR</td>
<td>Prospective and cross-sectional features</td>
<td>1. measure transcriptome in peripheral blood before and after exercise RR listen RR-eliciting</td>
<td>Participants who do not get the exercise RR</td>
<td>RR elicitation, especially after long-term practice, can generate health benefits downstream by improving mitochondrial energy production and utilization and thus increase resilience through upregulation of mitochondrial ATPase and insulin function. Resilience mitochondria can also be promoted by RR-induced downregulation of NF-kB related upstream and downstream targets that reduce stress.</td>
<td>8 weeks</td>
</tr>
<tr>
<td>6</td>
<td>Impact of a Concomitant Relaxation Technique Intervention on Medical and Health Behaviors in Patients Treated for Type 2 Diabetes mellitus(Yuko Katada, 2014)</td>
<td>A total of 49 participants. With 24 in the control group and 25 in the intervention group in patients with type 2 diabetes mellitus during treatment</td>
<td>Experimental</td>
<td>1. Interviews at the beginning of the baseline 2. Closing eyes 3. Muscle stretching techniques 4. Doing breathing techniques 5. interview at the end of the baseline</td>
<td>-</td>
<td>There are significant differences in the physical index (the concentration of salivary amylase, blood pressure, heart rate) and the relaxation scale between pre-intervention and post-intervention. Stable HbA1c level for intervention in a better range than with the previous year. PMR omissions with breathing techniques and stretching for the treatment of type 2 diabetes mellitus to improve self-control and stress management.</td>
<td>6 months</td>
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4 DISCUSSION

Generally all journals do review gives the results of that action can reduce stress relaxation which can lower blood glucose. Relaxation techniques gained the most effective and progressive good show is progressive muscle relaxation (PMR), is considered as a method of relieving stress and lowering blood sugar levels in patients with diabetes mellitus type 2. On the intervention of progressive muscle relaxation (PMR) patients learn to tighten and merileksasikan muscles regularly and after intervention PMR, the muscles become completely relaxed, can menbuat reduced stress and lower blood sugar levels. Some studies have also done other techniques, to measure progressive muscle relaxation (PMR) coupled with the provision of massage, education, and has shown that both methods have an effect on HRQOL and reduced blood sugar levels in patients with Type 2 Diabetes Mellitus. Fluctuations in blood glucose, diet and exercise limitation, cacatfisik and development of vascular disorders known as factors that influence diabetes, suggesting the disease is closely linked to the level of stress. In addition, the daily management of diabetes mellitus can cause high levels of stress, and stress continue to cause anxiety and depression in these patients. It should be noted that the body responds to stress by releasing hormones that counteract the effects of insulin, leading to insulin resistance. Stress leads to eat more and exercise less. And berhubungandengan poor quality of life and health perception. Health related quality of life (HRQOL) refers to the level of social welfare, physical and emotional in patients undergoing medical treatment. A number of studies have reported lower HRQOL in patients with Type 2 diabetes mellitus compared to healthy people. One of the main factors that affect HRQOL in these patients is the psychological stress due to constant self-management. Therefore, reduce diabetes-related type of difficulty likely to be an important predictive factor for improving HRQOL in patients with Diabetes Mellitus Type 2. Education also has an important role to improve the level of HRQOL in patients with Type 2 Diabetes Mellitus. A number of studies have reported lower HRQOL in patients with type 2 diabetes mellitus compared to healthy people. One of the main factors that affect HRQOL in these patients is the psychological stress due to constant self-management. Therefore, reduce diabetes-related type of difficulty likely to be an important predictive factor for improving HRQOL in patients with Type 2 Diabetes Mellitus. Education also has an important role to improve the level of HRQOL in patients with Diabetes Mellitus Type 2. Education also has an important role to improve the level of HRQOL in patients with Type 2 Diabetes Mellitus (Ghezeljeh Najafi et al., 2017). (Koloverou et al., 2014) declared one of the stress management techniques of the most popular is progressive muscle relaxation (PMR), which combines both physical and mental components. Knowledge of relaxation breathing (RB) is typically diperlukanuntuk proper application. According to research data, the combination of these techniques (RB-PMR) with others (bio feed back, guided imagery, CBT) has been shown beneficial effects in reducing stress levels, despite the positive metabolic action has not been proven. It can be concluded that inadequate and the results of several studies are available, particularly regarding the effects of these techniques on glycemic control. While there is still no systematic review of randomized clinical trials that have used PMR-RB to improve glikemic control in patients with type 2 diabetes mellitus.

(Vander Wal et al., 2015) say the results supported the role of education and relaxation in behavioral treatment of SEN. According to the model biobehavioral NES, is a disorder that results from a genetic predisposition, coupled with stress, causing an increase in the reuptake of serotonin, thereby dampen the circadian rhythm and reduced satiety. Biobehavioral using the model as a guide, we developed a brief behavioral intervention, consisting of information about SEN, healthy eating, and the importance of sleep and hygiene, coupled with exercise and use of relaxation. Used as a treatment before going to bed, and efficacious in the treatment of SEN.

Quality of life related to health (HRQOL) is an important concept, cover a wide range of human experience. HRQOL in subjects with diabetes has been proven to be quite affected, compared with the other subjects with chronic disease, and is influenced by different factors, with cardiovascular disease and non-vascular as the strongest predictor. Stress can be an important factor for the development of type 2 diabetes mellitus, through the
hypothalamic arousal syndrome, including the activation of hypothalamic pituitary adrenal axis parallel and central sympathetic nervous system, through the metabolic syndrome, including central obesity and insulin resistance. So, it is so natural to think that stress reduction techniques may be useful for the treatment of type 2 diabetes and a positive effect on HRQOL. (Wandell et al., 2012).

(Bhasin et al., 2013) Stating the relaxation response (RR) is a state opposite to the psychological stress or flight response. The results of rigorous research shows the ability of the mind body interventions to reduce chronic stress and improve health through the induction of RR. Several studies have also reported that RR elicitation is effective therapeutic intervention to counter the adverse clinical effects of stress in patients with diabetes mellitus. The purpose of this study was to determine the relaxation response intervention in the energy metabolism, mitochondrial function, insulin secretion and stress related pathways. This study shows that RR elicitation, especially after long-term practice, can generate health benefits by improving mitochondrial energy production and utilization and thus increase resilience through upregulation of mitochondrial ATPase and insulin function. Resilience mitochondria can also be promoted by RR-induced downregulation of NF-κB associated that reduces stress.

(Yuko Katada, 2014) Once breathing PMR has been practiced, the general decline seen in systolic blood pressure after performing the technique, and a significant decline seen in pulse after 1-2 months of the intervention. Salivary amylase value indicates that the relaxation response is usually acquired, except for some data. Among the subjective response, a feeling of relaxation increased significantly by 6 months, indicating that relaxation techniques with breathing techniques PMR. Relaxation techniques began to be adopted normally in daily life and used properly in some places. Every patient encounter stressful situations every day-to-day life. The use of breathing techniques when performed daily PMR is expected to reduce the body burden sustained tension and reduce the occurrence of emotional instability. Stability of physiological and subjective produced by relaxation also improve the ability to cope with stress in daily life. These findings suggest that the technique is effective as a means of self-control and can indirectly reduce blood glucose levels in patients with Type 2 Diabetes.

Nursing Implication for practice and Recommendation

Nurses in providing nursing services should apply relaxation techniques as a way to cope with stress can lower blood glucose levels in patients with Diabetes Mellitus. Nurses can also train patients how to perform relaxation techniques that can be used directly when required. This relaxation technique is also an intervention at an affordable cost. This relaxation technique is simple and can be done mandiri. Teknik relaxation can also be incorporated into non-farmakologi. Teknik relaxation therapy can be used as SOP and SAK so that it becomes an intervention for nurses.

Limitation

References that have been collected in this review sitematic not tested elsewhere or do research in different places. Good perception of each individual client, family and caregivers greatly influence the success of a given therapy as well as a winning environment action. Language literature searches were hampered because there is one article that uses a language other than English dankalad resources in translating English into Indonesian. The discussion is still used in the form of Relaxation in general to deal with problems in patients with diabetes mellitus.

5 CONCLUSION

Systematic review This aims to find evidence of the effect of relaxation techniques on blood sugar levels in patients with diabetes mellitus. Literature searches based on relevance and then evaluate the quality of literature. Temuan show that intervention can be applied to patients with diabetes mellitus in Indonesia in addition also needs attention be paid on the value of blood sugar levels, quality of life, patterns of physical activity and diet of the patient. Based on these studies the most effective method is the provision of progressive muscle relaxation action combined with massages administration, education and relaxation therapy by using a CD. Tiindakan conducted by these researchers can reduce blood sugar levels in patients with diabetes mellitus. But the weakness of the methodology, small sample size, short duration.
REFERENCES


