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Effectiveness of Telemedicine Interventions in Diabetes Management at Primary Care Settings in Asia: A Systematic Review Protocol

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ABSTRACT

Background: This systematic review will focus on the effectiveness of Telemedicine interventions on diabetic management at primary care settings in Asia. The objectives of this systematic review and meta-analysis are to synthesize the clinical effectiveness and to compare the effectiveness of Telemedicine interventions in the diabetes management in Asia.

Methodology: The conducting and reporting of this review will adhere to the PRISMA guidelines. The search strategy will include MeSH terms related to Diabetes, Telemedicine, Diabetic management, Primary Healthcare, Effectiveness, and Asia to find relevant studies. Other synonymous words will be searched using Boolean operator "AND"/"OR" on PUBMED, EMBASE, SCOPUS, COCHRANE. Randomized controlled trials examining the effectiveness of telemedicine interventions in the management of Diabetes Mellitus patients at Primary Care settings in Asia will be included. A random effects meta-analysis will be conducted with the REVMAN software version 5.3.5. Cumulative and comparative meta-analysis will be done with STATA software version SE16.

Discussion: This review and meta-analysis will be among the first to give an extensive purview on the effectiveness of telemedicine in diabetes management at Primary Care settings in Asian population.

Systematic review registration: The protocol has been registered at the International Prospective Register of Systematic Reviews (PROSPERO registration number: 42021210002).

Keywords: Diabetes Mellitus, Telemedicine, Primary Health Care, Asia

BACKGROUND

Telemedicine has been proved a boon for medical science especially in outreach and primary health care services. It has been very difficult to address the disease epidemiology at primary care either due to poor access or availability of health services. Telemedicine may fill this gap between patients at primary care and specialist services at tertiary center. Diabetes is a chronic disease that occurs either when the pancreas does not produce enough insulin or when the body cannot effectively use the insulin it produces. Hyperglycemia, or raised blood sugar, is a common effect of uncontrolled diabetes and over time leads to serious damage to many of the body's systems, especially the nerves and blood vessels. Diabetes is a major cause of blindness, kidney failure, heart attacks, stroke and lower limb amputation.[1]

Globally, approximately 463 million adults (20-79

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years), which comes out to be 9.3%, are living with diabetes; which by 2045 is estimated to rise to 700 million, according to a report published by International Diabetes Federation. The proportion of people living with diabetes is increasing rapidly in most countries. Around 79% of adults with diabetes are living in low- and middle- income countries. In 2019, Diabetes alone caused 4.2 million deaths. It is one of the fastest growing health challenges of the 21st century, with the number of adults living with diabetes having more than tripled over the past 20 years.[1]

There are no simple solutions for addressing diabetes but coordinated, multicomponent intervention can make a significant difference. Everyone can play a role in reducing the impact of all forms of diabetes. Health care providers, people with diabetes, civil society, technology are all stakeholders. Collectively they can make a significant contribution to halt the rise in diabetes and improve the lives of those living with the disease.

DM patients have to take medication throughout their life and adjust their diets and daily activities in order to keep their blood glucose at a safe level. Uncontrolled rising blood glucose level causes long-term and irreversible damage to the body system, and it may adversely affect quality of life and cause serious complications. DM patients have to take regular follow-up treatments in the outpatient clinics. Therefore self- as well as clinical management is an essential component of glycemic control.

Essential DM management includes good self-monitoring of the patient's blood glucose level, strict adherence to prescribed medial regimens and lifestyle modifications such as dietary modifications, regular exercises and better control of body weight. However, DM patients who receive no formal training or education may suffer from many complications because of poor self-management.

Primary health care is considered as the most efficient, fair and cost effective approach to provide community. In general, primary health care provides health services, preventive education or promotion and disease management for individuals in the community.

Telehealth interventions use information and communication technology to improve health outcomes. These interventions increase the access to care and medical information[2]. Most importantly it helps overcome the geographical barrier of providing clinical services to patients. With the advances in telecommunications and the popular use of mobile devices, primary health care can reach a larger patient population.[3]

The effectiveness of Telehealth interventions on management of DM is rarely investigated in Asia. To achieve this, the review focuses on the effectiveness of Telemedicine interventions on diabetic management in Asian population.

METHODS

The following protocol will adhere to the PRISMA guidelines.[4] The protocol has been registered at the International Prospective Register of Systematic Reviews (PROSPERO registration number: 42021210002).

The objectives of this systematic review and meta-analysis are: a) to synthesize the clinical effectiveness of Telemedicine interventions in management of diabetic patients at primary care settings in Asia and b) to compare the effectiveness of different strategies of Telemedicine interventions in the management of diabetic patients in Asia.

Data sources search terms and search strategy:

The search strategy will include MeSH terms related to Diabetes, Telemedicine, Diabetic management, Primary Healthcare, Effectiveness, and Asia to find relevant studies. Other synonymous words will be searched using Boolean operator "AND"/"OR". Systematic searches will be conducted by combining every possible combination of the MeSH terms. An electronic database search will be performed using PUBMED, EMBASE, SCOPUS, COCHRANE. Cross reference of all the included studies will be examined to find out any other missed out relevant studies and will be searched through Google Scholar.

Library services and research support team will be consulted for verifying the search strategy. Hand searching of thesis conducted in institution in past 5 years on the topic will also be done. Concerned PG will be contacted telephonically for information on thesis of any other PG on the same topic.

The searches will not be limited by historical time-constraints but limited by language. After the literature search, the records will be collected into End-Note X9 for deduplication of the records. References which will be remaining after deletion of duplicates will then be transported to an Excel file. The records will be scanned independently by two reviewers on the basis of their titles and abstracts and eligible studies will be selected.

Inclusion criteria:

Type of study design used

Randomized Controlled Trials examining the effectiveness of Telemedicine interventions in the management of diabetic patients will be eligible for inclusion.

Study population

Study population will include the published articles in which the participants were patients diagnosed with Type 1 or Type 2 or both.

Intervention

This systematic review will include the published articles in which the intervention was done through telemedicine strategies. Telemedicine was opera-

tionally defined as "the delivery of health care services, where distance is a critical factor, by all health care professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment and prevention of disease and injuries, research and evaluation, and for the continuing education of health care providers, all in the interests of advancing the health of individuals and their communities".[5]

Intervention and control conditions were classified into either one of the following categories based upon an adaptation of the definitions from the American Telemedicine Association:[6]

1. Tele-education: "Any intervention aimed at educating, teaching, or training patients remotely using live interactive streaming or by stored educational material."
2. Tele-monitoring: "Any process which allows for the delivery and/or exchange of information to monitor a health status of a patient remotely."
3. Tele-consultation: "Two-way communication between a patient and healthcare provider aimed at providing care from a distance."
4. Tele-case-management: "Any collaborative initiative to integrate the assessment, care coordination, or evaluation to meet the needs of the patient."
5. Tele-mentoring: "Any intervention to support, guide, or mentor an individual from a distance by another peer who has gone through a similar experience."

Comparator

Studies with the comparator as the usual care in the management of diabetic patient will be reviewed.

Outcomes

RCTs with the outcomes as mean change in absolute glycated hemoglobin (HbA1c), Fasting Glucose levels, Quality of life, and psychological distress will be included.

Publication time span

RCTs examining the effectiveness of Telemedicine interventions in the management of patients diagnosed with Type 1 or Type 2, conducted since inception till September 2020 will be reviewed.

Study setting

RCTs which include the primary health care settings will be reviewed.

Language of the published literature

This review will be limited to articles published in peer-reviewed journals in English.

Exclusion criteria:

i. Studies other than the above mentioned study design will be excluded.
ii. Studies in which the diabetic patients were not the main participants will be excluded
iii. Studies of gestational DM will be excluded
iv. Patients under treatment for cancer or other life threatening illnesses, with cognitive or mobility impairment, or in need of nursing care will be excluded.

Assessment of the risk of bias

Cochrane Collaboration's tool will be used to assess the risk of bias of the selected studies. The tool assesses the selection bias, performance bias, detection bias, attrition bias, and reporting bias. Ratings of 'low risk of bias', 'high risk of bias' or 'unknown bias' will be assigned to represent the bias risk of the studies.[7]

Meta-analysis

Cochran's Q will be used to assess heterogeneity. Using this test, it is assumed that the studies are drawn from the same diabetic population and measure the same thing. I^2 will also be used to estimate the heterogeneity. Review Manager of the Cochrane Collaboration (RevMan version 5.3.5) will be used for synthesizing data. The weighted mean difference with 95% confidence intervals will be considered in the forest plot as the predefined outcome measures. The different type of telemedicine strategies were compared and ranked by the surface under the cumulative ranking curve (SUCRA). The SUCRA is a numeric presentation of the overall ranking and presents a single number associated with the treatment/intervention. SUCRA values ranges from 0 to 1. The intervention with higher the SUCRA value and closer to 1, this means that intervention has the higher probability to be the best.[8]

DISCUSSION

This review and meta-analysis, to the best of our knowledge and belief, will be among the first to give an extensive purview on the effectiveness of telemedicine in diabetes management at Primary Care settings in Asian population. This study will also acknowledge the effects of different telemedicine strategies with an attempt to compare the same.

ETHICS AND DISSEMINATION

Institutional Ethics Committee approval was obtained. The results of this review will be submitted for peer-reviewed publication.

REVIEW STATUS

The research team has commenced searching relevant studies in the relevant databases. This review is expected to be complete by May 2021.

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