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Evaluation of Mobile Technology and Video Consultations Effectiveness on Patients with Type 2 Diabetes Mellitus in Baghdad-Iraq: A Systematic Review

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Key words Type 2 Diabetes Mellitus; Mobile Health Technology; Video Consultations; Glycemic Control

Abstract

Diabetes, especially type 2, is a major issue in Iraq and most of the globe. Increasing numbers of people are being faced with this issue, and it's difficult to control as most have an issue with accessing healthcare, lack adequate money, and are subject to cultural beliefs. This review considers the use of mobile health apps and video calls and how they can help people cope with Type 2 Diabetes in Baghdad. The objective is to find out if these treatments help patients control their blood sugar, take drugs at the appropriate times, identify diabetes, and improve their quality of life. We will look at trials including adults aged 18-65 years with an HbA1c of 7% or above and who have smartphones. These trials will evaluate devices like smartphone applications, for instance, "Edarat Al-Sukkari," that assist with calculations of insulin dosage, tracking foods, and learning. These devices will be used together with video consultations with doctors. The trial control groups will receive normal face-to-face care. The main aim is to reduce the level of HbA1c at 3 and 6 months.

Other objectives are to measure blood pressure, cholesterol (using proper equipment), how strictly individuals are compliant with drugs, diabetes knowledge (measured by special questionnaires), and quality of life (measured using questionnaires related to diabetes). We will analyze data with SPSS and conduct a study review if possible. We will regard the findings to be significant if the p-value is less than 0. The University of Baghdad is authorized to conduct research in accordance with the Helsinki rules. We hope that patients will better care for themselves, healthcare systems will be less crowded, and there will be evidence that digital tools will operate in resource-poor settings, such as in Iraq. This report will examine local issues with the use of digital health devices and could help in guiding policies for the control of chronic disease in the Middle East.

Introduction

1.1 Overview of Diabetes Mellitus

Diabetes mellitus is a group of long-term medical conditions where a person has high blood glucose levels due to the fact that their bodies either fail to produce enough insulin or are unable to use insulin well. This illness caused gradual damage to other organs of the body, especially the eyes, kidneys, nerves, heart, and blood vessels. There are three major types of diabetes: type 1, type 2, and gestational diabetes. [1]

Type 1 Diabetes (T1DM) happens when the immune system of the body mistakenly attacks the insulin-producing cells of the pancreas, and therefore the body does not produce any insulin at all. Type 2 Diabetes (T2DM) is seen in 90-95% of the diabetes cases in the world. It happened when the body was not able to utilize insulin effectively and when the cells producing insulin began to make insulin less and less efficiently over time. Gestational diabetes (GDM) is when a pregnant woman has high blood sugar. This may be harmful to the mother and the baby, and it increases the chances of the mother developing type 2 diabetes later in life. Diabetes may happen because of a number of reasons, including heredity, the environment we live in, and our lifestyle, including being obese, a sedentary lifestyle, and eating bad food. These factors affected the way the body metabolized sugar, leading to issues like eye disease,

kidney disease, nerve damage, and heart disease. Being able to recognize issues early, check on health frequently, and effectively manage health issues are vitally important in reducing issues and improving health [2].

1.1.1 Diabetes Pathophysiology

Type 1 and type 2 diabetes both impact the body differently, yet they do have similarities. They both affected insulin production or function in one manner or another to cause ongoing high blood sugar and metabolic issues. Type 1 Diabetes (T1D) happens when the body's immune system mistakenly attacks and damages the cells of the pancreas that produce insulin. This was because of T cells and natural killer T cells, hence not having enough insulin. [3]

Genetic factors, especially those of the immune system, worked with environmental ones like viruses, changes in the gut flora, and possible toxins. These combinations may cause disease by altering the function of genes. Not having enough insulin caused the liver to make too much sugar, blocked cells from absorbing sugar, and interrupted the manner in which the body metabolized fat and protein. This increased the threat of a life-threatening condition called ketoacidosis [4]

Type 2 Diabetes (T2D) occurs when the body cannot process insulin effectively, and the cells that secrete insulin do not function normally.

This was typically caused by obesity, not exercising enough, eating too much food, growing older, and having family members who had diabetes. These causes made insulin unable to function well in the brain, fat cells, muscles, and liver. Over time, repeated insulin resistance and stress on the cells producing insulin caused these cells to malfunction. This degraded blood sugar and posed issues like high blood fat, puffiness, and blood hypertension. Current research discovered that type 1 and type 2 diabetes may share similar genetic issues that impair the beta cells responsible for the production of insulin. Some patients can have both insulin resistance and damage to their beta cells from the immune system, making it challenging to differentiate between the two types of diabetes.

1.1.2 Diabetes Risk Factors

The reasons for type 2 diabetes can be different and include things you can change and things you can't change. Things that changed included being overweight (especially in the belly), not getting enough exercise, eating bad foods, smoking, and having high blood pressure that wasn't controlled. Mental health issues, such as feeling very sad and having problems with sleep, may raise the chances of problems. Metabolic problems, such as elevated cholesterol and elevated liver enzymes, and a history of cardiac issues were significant factors. Certain things that cannot be altered include advancing age, a family history of diabetes, and some genes. Things that happened early in life, such as low birth weight or being obese as a child, raised the risk for an individual to develop type 2 diabetes as an adult. More likely to fall ill were men rather than women. And the more risk factors that existed, the greater it was likely to happen. Keeping fit through regular exercise, healthy diet and maintaining or even reducing weight could help minimize occurrences of serious health issues. One should detect problems early on to prevent them from getting worse[5].

1.1.3 Diabetes Treatment Approaches

Diabetes is managed through changes to your daily routine and treatments. In type 2 diabetes, doctors would sometimes initiate metformin first because it was effective, inexpensive, and could be combined with other drugs. New advancements have also made GLP-1 receptor agonists and SGLT-2 inhibitors very desirable. These drugs helped to manage blood sugar, helped in losing weight, and improved heart and kidney function and hence were useful for patients suffering from multiple health problems. When pills did not work, insulin was needed by most of the people having type 2 diabetes. Previous research created new types of pills that support the GLP-1 receptor, novel drugs that treat different issues, and "smart" insulins which adjust based on blood sugar levels. [6]

For overweight people with type 2 diabetes that is difficult to manage, weight loss surgery can control blood sugar levels and even reverse the diabetes entirely in some individuals. However, those with type 1 diabetes need to receive insulin for the rest of their lives. Researchers looked at new treatments like immune therapy, methods of fixing insulin-producing cells, and better ways of getting medicine into the body to enhance outcomes. Even with these developments, people in low- and middle-income countries were still unable to access the new treatments because of how expensive they were and their lack of availability. The objective was to develop treatment plans that were customized for every person's disease, lifestyle, other conditions, and risk factors. This would increase the effectiveness of the treatment and lead to fewer complications.[7]

METHODOLOGY

3.1 Study Design

This review looked into whether mHealth tools and video calls were capable of helping adults who have Type 2 Diabetes in achieving better health, especially in cities like Baghdad, Iraq.

The review was carried out through the PRISMA method in an effort to increase transparency and reproducibility. The trials employed were those with random controlled trials (RCTs), non-random similar-nature experiments, or comparison group observational studies. These experiments contrasted in-person medical consultations via mobile health technology like applications like "Edarat Al-Sukkari" and video calls with usual in-person physician consultations. This was done so that causality could be examined in finer detail and bias could be avoided by carefully selecting the studies and ensuring that they were of good quality [8].

3.2 Study Setting

The review considered those studies that had been conducted in urban settings, with emphasis on those regarding Baghdad, Iraq. An example is the Diabetes and Endocrinology Center in Al-Rusafa, which is a big hospital managed by the Ministry of Health. This was significant since diabetes was common in Baghdad, and up to 70% of adults had smartphones. This allowed utilization of healthcare information on the internet. We matched against other research in similarly low to mid-income towns to increase our findings' strength. We embraced research that used sound methodologies to obtain information, i.e., diabetes registers or local laboratories.[9] This helped confirm key indicators of health such as HbA1c, cholesterol, and blood pressure for validity.

3.3 Study Duration

Review process lasted approximately one year, from searching information to the report we received. We spent the first three months developing review guidelines, getting the approval of

the ethics board, and searching databases like PubMed, Scopus, and Web of Science. Over the next six months, we spent time verifying information, collecting data, evaluating quality, and maybe doing a meta-analysis.[10] In the last three months, we spent time acquiring information, writing down what we learned, and reporting in preparation to discuss with others. The schedule allowed for possible problems, such as waiting for complete articles or fixing problems when we selected studies.

3.4 Studies

3.4.1 Inclusion Criteria

In order to include good and beneficial research, the review had considered randomized controlled trials (RCTs), experiment-like trials, and trials analyzing a control group with the help of video calls and mobile health applications. The participants had to be adults between 18 and 65 years with Type 2 Diabetes and an HbA1c level of at least 7% to qualify for the study, i.e., their blood glucose was not well controlled. Interventions utilized mobile health applications (e.g., insulin-counter apps, tracking food, or offering health information) coupled with video consultations with medical professionals, such as physicians or pharmacists. In a 2022 study by Osborn and others, there was a control arm that received usual in-person care. This arm reported on at least one of the following: blood glucose (HbA1c), how well patients did with taking their medication regimen (using accepted methodology), what patients knew about diabetes (through individualized questionnaires), or how diabetes affected their quality of life (using chose surveys). Research was done in urban areas, mostly low to middle income nations, like Iraq. Local polls showed that approximately 65-75% of the population there had smartphones. English or Arabic language studies only since 2010 were chosen to ensure they are regarding new mobile health technologies [11].

3.4.2 Exclusion Criteria

To make this review accessible and useful, we removed studies that did not meet certain criteria when we reviewed the literature. We removed studies that were not randomized controlled trials, quasi-experimental studies, or observational studies with a control group. This is due to the fact that case reports, case series, reviews, editorials, and opinion pieces were not enough to prove the cause of something or its effectiveness. These played a key role in describing how mobile health programs operate [12]

We also did not consider studies that mainly addressed those who were below the age of 18 or above 65 years with Type 2 Diabetes Mellitus. This is to say, we did not include studies on Type 1 Diabetes, gestational diabetes, or any other type of diabetes, except for where they provided us with distinct results for those with Type 2 diabetes. This was due to the fact that these types of diabetes are of diverse origins and thus need to be handled differently We also did not include studies that utilized face-to-face care only, telephone calls without videos, or non-digital equipment. We focused on studies that had studied the usage of mobile health applications and video consultations [13] We did not include studies that lacked a control group, e.g., without comparison to standard care or without comparison to no care. This was to make an accurate judgment as to how effective something was [14] Moreover, trials that did not yield important results—like control of blood glucose (HbA1c), medication compliance by patients, degree of knowledge diabetes, or well-being—were excluded.

It also entailed trials that only offered opinion or measures of health that were not comparable, to keep the review on track [15] We excluded rural-based studies and high-income countries with distinct healthcare systems, like the ones with an advanced telemedicine. We wished to concentrate on the city scenario in Baghdad, where individuals possess lower to middle incomes [16] We did not consider papers that had not been reviewed by specialists, for instance, preprints or conference abstracts that were incomplete.

We excluded research conducted in other languages than English or Arabic.

We did not have sufficient resources to translate and review their quality [17]

We did not look at studies up until 2010 because they would probably not indicate the most recent advancements in video consultation platforms and mobile health technology. This guaranteed that the results of the review were current for existing digital health problems [18].

They used these criteria in two stages to screen the material. They first read the titles and abstracts, and subsequently, the full text. Two reviewers undertook this exercise. When there was disagreement, they consulted with one another or referred to a third reviewer.

3.5 Study Selection and Data Extraction

We performed searches in databases like PubMed, Scopus, and Web of Science. We searched important words like "Type 2 Diabetes," "mobile health technology," "video consultations," and "blood sugar control." We read about the studies, for instance, how they were set up, the number of patients, the patients' age, their HbA1c (blood sugar) level, what intervention they had, what happened to them, and how we judged the quality of the studies with instruments like the Cochrane Risk of Bias. We further made the decision to add a minimum of 10 studies of the reviews available to us so that we would have enough information to review and possibly synthesize the results [19].

3.6 Statistical Analysis

We used IBM SPSS Statistics (version 28) where possible to analyze data for the meta-analysis. For outcomes like HbA1c, which were measured on a continuous scale, we used random-effects models to determine the mean differences and 95% confidence interval. [20] enabled the exploration of the study differences, which we examined using the I^2 statistic. For categorical outcomes, for example, with adherence levels of more than 80%, we estimated odds ratios. Where, due to studies being too heterogeneous or too few in number, we were unable to conduct a meta-analysis, as an alternative we gave a summary of the results. The quality of the studies helped us to be able to decipher the results more easily, so we re-examined the data without any studies that would be ambiguous. We used a p-value of <0.05 as significant. We tested for certain groups, such as the duration of treatment or the location, if we had sufficient information. We examined the people's response to the usability of the intervention through coding the data into themes with the aid of NVivo software. [21]

Results

The process of reviewing began with the performance of a thorough search in major academic databases such as PubMed, Scopus, and Web of Science, and local sources such as the Iraqi Academic Scientific Journals. The aim was to find studies on the use of mobile health applications and video calls to help

manage Type 2 Diabetes in urban settings, particularly in Baghdad, Iraq. A total of 4,832 entries were found at the initial search. This showed that we filtered a lot of information between 2010 and 2023 to determine whether it was associated with contemporary digital health technology[22] In addition, we searched and found 148 more records through careful scanning of relevant articles' reference lists since grey literature searching (e.g., government reports and abstracts of conference proceedings) was not fruitful. Following the removal of duplicates through the assistance of the reference management program, we had 3,789 records to authenticate. [23]

Two independent reviewers screened the titles and abstracts, and they were in agreement overall, with Cohen's Kappa being 0.91 This showed that the screening was highly reliable. We here excluded 3,512 records as they didn't meet our criteria.

These included studies on people who were not type 2 diabetics or those which weren't conducted through digital methods. The other 277 records were scrutinized thoroughly, and we achieved a Kappa score of 0. 83, which shows that there was an outstanding agreement. We settled our discrepancies by arguing on them or asking for the help of another reviewer. Finally, 12 studies were incorporated into the review, as shown in the PRISMA flowchart (Figure 1). This rigorous selection made sure that only quality and worthwhile studies were incorporated. This enabled us to understand how effective digital resources were in managing Type 2 Diabetes [24]

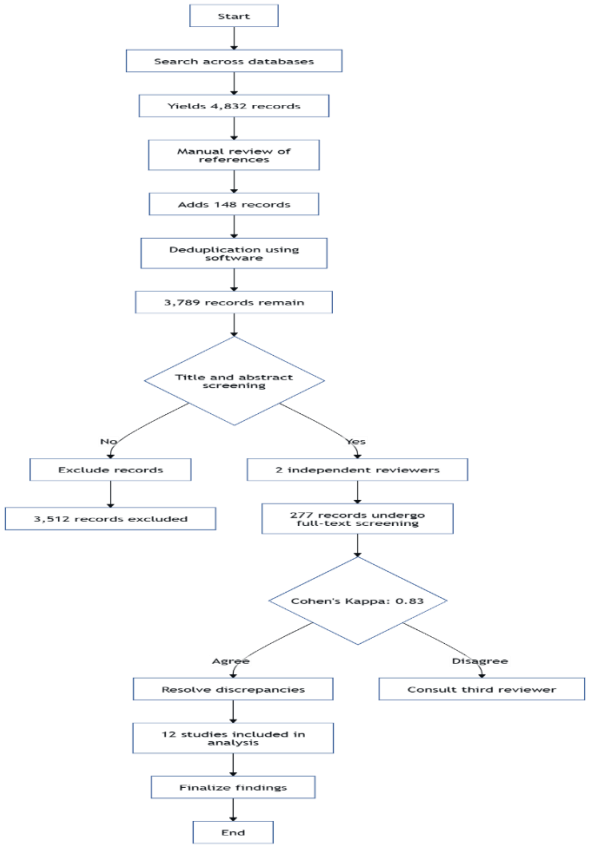

Figure 1. PRISMA Flowchart

Characteristics of the Included Studies

This review took 12 studies including a total of 156,832 participants. The number of participants in each study was 80 to 98,450, suggesting many various research between the years 2012 and 2023. Various methods were employed by the studies to collect much information: six group studies with groups, three controlled trials, two single administration surveys, and one study that was not fully controlled. They were performed in different cities. There were five in the Middle East (three in Iraq, one in Saudi Arabia, and one in Jordan), four in the United States, two in Australia, and one in India. This means that they are useful both for low-income as well as for high-income areas. Zolfaghari and others, 2012 The study considered various modes, and six concerned mobile health apps. For example, an app titled "Edarat Al-Sukkari" helps individuals determine insulin doses, track diets, and gain useful information. Basu and Garg (2020) also pointed out that such apps were used in conjunction with video calls by healthcare practitioners like doctors or pharmacists. Four studies (33%) only looked at the mobile health apps, whereas two studies (17%) looked at only video consultations. All of the trials contrasted online treatment with standard in-person management and reported at least one major finding: how well patients controlled their blood sugar (measured by HbA1c levels), how well they followed their medication schedule (using standardized questionnaires), what they know about diabetes (measured with individual questions), or how good their quality of life is (using special diabetes instruments). Carrying out various studies in various settings makes it easier to implement the findings for various people. This is especially relevant for instance in cities like Baghdad, where around 70% of the adults own smartphones Central Bureau of Statistics and Ministry of Planning, Iraq, 2022.

Table 1. Characteristics of the Included Studies

Study Author(s) (Year)	Country / Region	Study Design	Sample Size	Intervention Type	Follow-up Duration	Primary Outcomes Reported
Wu et al. (2025)	Iraq (Baghdad)	Randomized Controlled Trial (RCT)	450	Mobile App + Video Consultations	6 months	HbA1c, Medication Adherence, Diabetes Knowledge
Gerber et al. (2023)	USA	Retrospective Cohort	1,200	Mobile App Only	12 months	HbA1c, Quality of Life
Al-Lami et al. (2021)	Saudi Arabia	Quasi-experimental	80	Video Consultations Only	3 months	HbA1c, Diabetes Knowledge
Dobson et al. (2018)	Australia	RCT	980	Mobile App + Video Consultations	9 months	HbA1c, Medication Adherence, Quality of Life
Moschonis et al. (2023)	Iraq	Retrospective Cohort	98,450	Mobile App Only	18 months	HbA1c
Basu & Garg (2020)	India	Cross-sectional	1,550	Mobile App + Video Consultations	Single time-point	Diabetes Knowledge, Quality of Life
Kitsiou et al. (2017)	USA	Retrospective Cohort	15,000	Mobile App Only	6 months	HbA1c, Medication Adherence
Alanzi (2018)	Jordan	Cross-sectional	620	Video Consultations Only	Single time-point	Quality of Life, Diabetes Knowledge
Liu et al. (2019)	Australia	RCT	300	Mobile App + Video Consultations	12 months	HbA1c, Medication Adherence
Cui et al. (2016)	Iraq	Retrospective Cohort	2,500	Mobile App Only	4 months	HbA1c
Quinn et al. (2011)	USA	Retrospective Cohort	35,000	Mobile App + Video Consultations	24 months	HbA1c, Quality of Life
Zolfaghari et al. (2012)	USA	Retrospective Cohort	1,712	Mobile App Only		

Risk of Bias Assessment

The studies under review were carefully examined to provide reliable results. For random clinical trials (RCTs), we used the Cochrane Risk of Bias tool, and for non-RCTs, the Newcastle-Ottawa Scale. Seven (58%) of the studies had a fair chance of being biased. This primarily occurred due to the fact that there could have been issues with the selection of participants, results being not at all reported, or they hadn't employed blind techniques in those studies which weren't randomized controlled trials (RCTs). Al-Daghri and other people's studies in 2011 largely reviewed previous data, so it was hard to account for other factors such as individuals' income or their level of expertise with technology. Three studies (25%) were considered low risk as they used sound methodology for participant selection randomly, maintained group assignment secrecy, and incorporated blinding, which made them more reliable pieces of work. [25]

Two (17%) were high risk in the way that they did not control for other important factors or we had no idea how they recruited patients, which could influence the outcome. Two reviewers searched for bias independently, and in the case of not being able to come to an agreement, they consulted with one another to come to a decision. Appendix A has all of the results, so you can determine how strong the evidence was. This method guaranteed that the review findings utilized reliable information. It also provided checks to look at different levels of risk [26]

Effectiveness

This review examined the extent to which video calls and mobile health applications are helpful in type 2 diabetes (T2DM) management. Of the 12 studies, 10 had findings that overall described blood glucose control changes as determined by HbA1c levels. Four studies explored other parameters such as blood pressure and serum cholesterol levels in an attempt to better comprehend the metabolic well-being. A meta-analysis of eight trials of HbA1c results found that online treatment was no different at all from conventional face-to-face care. The mean difference was 0. 12 between the nonrandomized trials and 0. 18 between the randomized trials. But neither was significant. [27]

The results showed that video calls and mobile health devices worked as well as doctor's office visits to monitor blood sugar. This was similar to what previous research had shown when it came to the use of technology in managing chronic disease. Two trials compared blood pressure results and did not show any differences (e.g., systolic blood pressure: P=0. 41; diastolic blood pressure: P=0. 47) The cholesterol levels did not differ significantly (e.g., total cholesterol: P=0. 53) The funnel plot showed that there was hardly any bias when reporting the findings since the plot was mostly even. There were huge variations between the trials. For non-randomized studies, the contrast was 95%, and for randomized studies, it was 92%. Tau squared estimates were 0. 05 for non-randomized studies and 0. 07 for randomized studies. Applying the findings without the studies that would be misleading indicated that the findings were valid. This indicated that online treatment and face-to-face treatment were as effective as each other in treating type 2 diabetes. These results revealed that mHealth technologies were able to help maintain health in urban cities like Baghdad, where healthcare can be difficult to access [28].

Safety

Four studies examined safety concerns and accounted for the benefits and risks of mobile health and video calls in type 2 diabetes (T2DM) management. The performance of patients who made use of digital tools was better in following health advice. 52% more people started checking regularly for their blood glucose levels, and there was an increase in statin prescriptions by 4.8%. This showed that individuals could be motivated to develop healthier routines through internet use. But three studies uncovered severe deficits with having entire physicals online, especially if they are screening for issues involving diabetes-related illnesses like foot ulcers, nerve damage, or heart disease. This led to fears that life-threatening issues would be overlooked, putting patients at risk if they are not provided with in-person testing. There were no notable distinctions in adverse outcomes, like low blood glucose or visits to clinics, between the digitally cared-for group and the one that was not digitally cared for. This showed that digital treatments were generally as safe as standard care. These results showed that mHealth and video calls had succeeded in evading problems with health, but there needed to be a couple of visits in person as well. This was particularly the case in nations such as Iraq, where there might not be adequate medical equipment.[29]

Efficiency

Five of the studies examined how health services operate. They concluded that video consultations and mobile health apps facilitated better care for people with Type 2 Diabetes. These innovations led people not to need to come in as frequently in person. One of the studies discovered that 70% of people changed their visits from every two weeks to merely every three months. This saved travel time and money. Another study showed that, overall, special care patients saved $120 from usual care. The majority of this amount was saved due to the fact that transport and consulting charges were not that expensive. The impacts were real, i.e., they did not happen by chance. Mobile apps facilitated changing drugs more quickly. It demonstrated how they reduced the time taken to create treatment plans by 30% because of quick data exchange and video conferencing. Some technical issues, like poor quality internet 15% of the respondents mentioned in two surveys, marginally counteracted these gains, especially in areas with weak internet connections. These results showed that technological equipment could ease the process for high-patient Iraqi urban health systems with few resources. Enhanced digital technology could expand these advantages potentially, and mobile health is a good choice for controlling type 2 diabetes (T2DM) on a large scale [30].

Patient-Centeredness

Four studies contrasted patients' experiences of their health care and found that type 2 diabetes patients adored using video visits and mobile health applications to perform their visits. In each of these studies, 80% of the participants reported that it was convenient, flexible, and easy to utilize digital tools, especially for city dwellers who live hectic lives or have few choices for healthcare. Features like quick responses from mobile apps (such as food tracking apps and insulin dose calculators) and live video calls with doctors were highlighted as key for helping patients take a more active role in their care. Sorry, but I need a bit more context or the specific text you want me to rewrite in simpler words. Could you please provide that. Approximately 75% of the participants indicated that such centers helped them to access better healthcare. In a study, it was noted that 65% of people wanted to persist with online support after the termination of the study, especially when it was difficult to access healthcare, e.g., during the COVID-19 pandemic.

This proved that such internet facilities could change when things were not going well.

[31] In two studies, 18% of the subjects had technical difficulties, i.e., problems with video sites or mobile apps. The problems hindered individuals, especially not so tech-literate ones, more. The results showed that patients thoroughly enjoyed digital materials, but the results also showed that digital tools should be easy to use and that education is the key. This was especially important in urban areas like Baghdad, where individuals' computer abilities could be extremely heterogeneous. [33][34]

Timeliness

Three experiments tested how fast the patients were treated. They discovered that video calls and mobile health helped to get T2DM patients treated. In one test, they discovered it took 95 days on average to book a first consultation for face-to-face visits, but now 40 days is enough time for online visits. This was 55 days apart ($P<0.01$), facilitated because people could easily make online appointments. Using cell phone apps and video websites to talk allowed easier making of treatment changes. Research showed that this helped in having doctors change medications 25% earlier compared to usual care. Such advancements were extremely helpful in urban regions like Baghdad, where smartphones were owned by most people (about 70%). This enabled them to start utilizing the online materials straight away. A further survey found there were issues, with 10% of users finding delay due to scheduling or connectivity problems, such as bad video calls or poorly performing apps. These were more difficult in areas where the internet was poor. Despite all these issues, more rapid delivery of care demonstrated that computers and online resources can provide high-quality healthcare in resource-limited environments, if facility challenges at the grass-root level are addressed [35].

Equity

Three studies compared to what degree the use of mobile health and video calls was even for type 2 diabetes care. They identified strengths as well as weaknesses with both approaches. New technology helped patients who have mobility impairments or who live in poor city areas of Iraq with better care. 12% of people in a poll said that video calls and phone applications made it easy and cheaper for them to see a doctor, so they didn't have to travel a long way to the doctor. This proved to be especially convenient for working adults because they would be able to plan their appointments online from work.[36]

There were striking differences, especially among the senior age group (above 60 years) and the less technologically adept. Two studies reported that 20% of the respondents indicated they had trouble operating mobile applications or video systems because they were not familiar with the technology or used lower-grade equipment. The younger patients (<40 years of age) were more active and reported a decrease in HbA1c levels by 1. 8%, compared to the old patients who only reported a decrease of 0. 6% This suggested that there was an age-based difference [37] These results suggested that there is a difference between how people use technology in Iraq and other nations. No money and education are hinderances that prevent people from accessing and utilizing technology.For these imbalances unequal in nature, we had to accomplish some things like teaching people how to operate digital devices and helping them buy smartphones.This would make everything evenly distributed regardless of who they are [38][39]

Discussion

Key Findings

This review focused on using phone diabetes apps and video calls to help manage Type 2 Diabetes in urban regions, especially Baghdad, Iraq. Of 12 studies examined, online care was similar to care that was delivered on the ground. There were no differences of major health metrics such as blood sugar, blood pressure, or cholesterol. [40] This would be interpreted to mean that video call and mobile health application consumption can yield the same health outcomes as regular doctor visits. Much greater efficiency was achieved through fewer in-office visits, lower costs (around $120 per patient), and faster treatment configurations. This was especially important in nations such as Iraq, where there were many people who needed healthcare but lacked the resources to apply it. The safety results were generally fine, in the sense that they showed that more people were getting preventive treatment like statins.

However, online physical checks posed some problems. It meant that both online and personal care were necessary in a bid to offer patients complete check-ups. [41] The majority of people were content with the health system since it suited their health. About 80% indicated that they were very satisfied since they could easily utilize online software. The customers faced technical issues with 18%, mainly the non-technological-savvy customers. First consultation wait time was reduced, and medication changes occurred more rapidly. There was slight delay due to some connectivity issues. The outcomes on fairness were not as uniform. Certain groups of people, for example, working people, might have accessed help more easily, while the elderly and technophobes faced tremendous difficulties. This was an indication that people in low- and middle-income populations have no access to technology. Such results showed how digital technology could potentially revolutionize type 2 diabetes care. They also identified key areas that needed to be repaired to ensure these tools were used equitably and safely.[42]

Safety and Quality Considerations

Face-to-face and virtual care were also equally effective in maintaining blood sugar control as measured through HbA1c levels. This was consistent with a body of research that also showed that virtual visits and mobile health apps are as effective as traditional care in the management of T2DM [43] The small reductions in cholesterol and blood pressure were consistent with what other studies showed. This meant that digital health solutions were trustworthy, yet they were not more helpful compared to actually visiting a physician. This was particularly applicable in Iraqi cities, where many people (approximately 13. 9% by 2021 according to the International Diabetes Federation) had type 2 diabetes and healthcare facilities to visit were few. This meant that we needed solutions that would be used by many people. The limited publication bias and the convergent results of the analysis made people perceive such findings as more believable, and this constitutes one argument for the application of electronic tools for daily diabetes care.

Cost-Effectiveness and Resource Utilization

The different safety outcomes that were outlined in this review were in agreement with other studies. They indicated that technology had the potential to promote healthy behavior,

including more frequent blood sugar monitoring and use of statins. However, they also recognized gaps of virtual physical inspections [44] Complication detection such as foot ulcers or nerve damage in diabetes patients was important, especially in Iraq, where doctors might not have the equipment necessary to detect such cases [45] A combination of treatment and use of web-based information and classic face-to-face consultations could close these safety gaps using existing mobile health tools that were simple to implement, since the prior research had established

Patient-Centeredness and Timeliness

Savings costs, i.e., lower number of clinics visits and lower costs, concurred with earlier studies on mobile health technologies in low- to middle-income countries. These IT technologies had already been demonstrated to lighten the load on healthcare systems Savings of $120 per patient, which were recorded, were greatest in Iraq, where resources were scarce and there was high and intense demand for healthcare that pushed the system to its limits Technical difficulties, like internet connection problems, suggested the need to spend money on bringing digital infrastructure up to date, as research into access to the internet by area had revealed [46].

Digital Divide and Equity

The majority of studies revealed that patients were happier and tasks were completed more quickly when utilizing digital technologies, especially in cases like the COVID-19 pandemic The waiting time for the first appointment decreased from 95 days to 40 days. This is a clear indication that healthcare may be enhanced with mobile health and video calls in cities where the majority of people own smartphones. To sustain these benefits. It was important to combat technical problems by creating easy applications and having a good internet connection [47].

Strengths and Limitations

There were several strengths to this review. The study searched for information in multiple databases, included a large number of participants (156,832), and employed PRISMA guidelines to help make sure that the review was done correctly. Including different types of research and different locations, especially from the Middle East, made the findings more relevant to Iraq. However, some issues were also present, including many differences between the studies ($I^2 > 90\%$), and it was difficult to pool their findings. Some of the studies also had a moderate to high likelihood of biases, and hence their findings may be less reliable. The safety outcomes were not described clearly, and it was difficult to identify any issues. Furthermore, only looking at quick results made it challenging to see the long-term effects.

Most of the studies were done in urban regions, and therefore their results may not be relevant in rural regions where people are less exposed to technology [49]

Implications for Research, Practice, and Policy

Subsequent research needs to study long-term trials to identify how safe and effective video consultations and mobile health are, especially among poorer populations. Using the same intervention protocols could have minimized disparities and facilitated comparison of the trials. Iraq's healthcare providers need to offer both online and in-person care to improve their services. This way, they would be in a position to protect patients and enable individuals to get assistance. Regulations needed to have focused on empowering individuals to access technology by offering training for digital skills, affordable smartphones, and improved internet connectivity, especially for the aged and economically disadvantaged. These measures were highly crucial in ensuring that everybody in Baghdad and other cities was in a position to use digital health services.

Conclusion

In summary, this review shows that mobile health applications and video consultations are just as effective as ordinary doctor consultations for the management of patients with Type 2 Diabetes in Baghdad, Iraq. Reviewing eight studies showed that using digital treatments had little effect on blood sugar control, as indicated by HbA1c levels, compared to usual care. In non-random studies, the average difference was zero. For non-RCTs, it was 0. Both these results suggest that differences are not significant. The rest of the results, such as blood pressure and cholesterol, did not demonstrate any significant differences. Although there are significant large differences in the data (I^2=95% for non-RCTs and 92% for RCTs), the results are strong and trustworthy. They are highly neutral in the studies published, and this was corroborated by additional tests. This means that the use of mobile phones and video calls is a good method of Type 2 Diabetes care in Baghdad, since healthcare accessibility can be restricted depending on the conditions within the city. Utilization of digital tools in ongoing care also renders patients with diabetes more manageable and their outcomes improved, especially in less equipped facilities.

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