Identifying the Barriers and Facilitators for Adherence Among Type 2 Diabetes Patients: Role of Health Behavior Change Models

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Abstract

The diagnosis of type 2 diabetes results in several complications which can be prevented with adherence to dietary, exercise and medical regimen. But many people fail to follow this. The objective of this study is to detect that factors the prevent and promote adherence with the role of health behavior change models along with counselling approach and an intervention to achieve change in individuals. The results show that adherence is determined by environmental and personality factors and the theories target these variables to elicit change among people. The paper implicates the importance of doctor patient communication and utilization of social support networks to increase adherence in people with diabetes.

Keywords: diabetes, adherence, health behaviour, theory

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Individuals with Type 2 Diabetes Mellitus (T2DM) are required to manage their illness more extensively by adhering to prescribed medication, dietary and exercise regimens, recognizing and responding to symptoms, and managing acute episodes. Evidence indicates low adherence rates to treatment recommendations among diabetic patient's (> 45.4%) has an estimated 100 billion dollars in preventable costs annually (Venkatesan, Dongre, & Ganapathy, 2018).

Health behaviour change models help make a sustainable lifestyle change, effective in the in the long term. The models of health behaviour change reviewed in this paper are based on the recent and relevant empirical studies with reference to diabetes.

Diabetes is a disorder in which the body's own insulin (the hormone that converts glucose from our food into energy) is ineffective, resulting in higher-than-normal blood sugar levels. Type 2 Diabetes Mellitus (T2DM) is a metabolic, chronic, and progressive disease marked by the relative lack of insulin (Modanloo, 2013).

Increased insulin resistance is a factor contributing to high incidence of Type 2 diabetes in Indians. Lower birth weight coupled with obesity in childhood and adolescence is also a factor. India is known as the diabetes capital of the world. By 2025, the country's diabetic population would have surpassed 69.9 million, and by 2030, it will have surpassed 80 million. (Pandey & Sharma, 2018).

Diabetes develops due to an unhealthy diet, high visceral fat and lack of exercise and has multifactorial consequences. Hence, it is vital to maintain the glycaemic index and haemoglobin level by adhering to the medical, exercise and dietary regimens.

Adherence is a term used in health psychology to indicate how closely an individual's behaviour matches health-related suggestions. (Burris et al.,1991).

Clinical investigations demonstrate that making small modifications to one's diet and physical exercise has the ability to cut the risk of type 2 diabetes in persons with poor glucose regulation by half and prevent the risk of complications like stroke and heart disease. (Magkos et al., 2009).

Barriers and Facilitators to Adherence

There are various factors effecting adherence, which are both preventive and promotive in nature.

***Dietary Adherence*.**

To achieve adequate glycaemic control, people with T2DM should eat a nutritious diet. Having a plant-based diet has shown to successfully lower the risk of the illness (Qian et al., 2019). In Ayurveda the concept of nutrition is not generic in nature, but is tailor made depending upon the *prakriti* or constitution of the individual. The prescribed diet ensures preserving health in all individuals (Satyavati, 2008). It is known that eating the *sattvic* diet which consists of eating fresh produce can prevent the occurrence of diabetes.

Dietary adherence has been found to be in between 44%–74% among diabetic patients (Mohammad & Sharew, 2019). A long-lasting change in an individual's eating habits can be particularly challenging, as eating behaviours are a result of cultural inheritance.

Barriers to diet adherence include high price of healthy food items which makes them inaccessible to people of lower SES. Urbanization is causing major deviations in dietary patterns leading to increased consumption of highly processed food (Mohan, 2004). Social

pressure of eating out, lack of self-discipline and unable to accept the disease (Jaworski, Panczyk, Cedro, & Kucharska, 2018)

Facilitators for dietary adherence are spousal support. Patients' diets are supported by their spouses by changing daily meals. Gender can also impact adherence. Women by utilizing formal and informal social support make healthier eating choices. (Mathew et al., 2012). For individuals that are intrinsically driven, healthy eating is a challenge and exciting, and they self-regulate their eating habits. (Koponen, Simonsen, & Suominen, 2019).

Exercise Adherence

Adults diagnosed with diabetes should participate in a minimum of 150 minutes of moderate intensity aerobic physical exercise each week, according to the American Diabetics Association (ADA) (Advika, Idiculla, & Kumari, 2017). Despite this, most diabetics fail to include exercise into their regular routines.

Indians typically work long hours and fail to exercise. Among females, cultural norms prevent them to exercise. The perception that diabetes weakens the body, acts as self-fulfilling prophecy by making the person slow down and became less active. (Lawton et al., 2006). Absence of awareness of obesity as a health problem because of family history, makes individual fail to recognize that they need to exercise. Inadequate infrastructure such as parks and walkways near the place of residence is an impediment to exercise.

Facilitators of exercise among diabetic patients include fear of moving on to insulin injections make them engage in physical activity to self-monitor their blood glucose. Experiencing gratification and achievement from exercising, and then observing their readings decrease was a positive reinforcer to continue to be active (Beverly & Wray, 2010). Listening to their peers' success stories of maintaining low blood glucose levels through

various kinds of physical activity can help motivate people with diabetes (Kadariya & Aro, 2018).

Medication Adherence

Poor medication adherence affects more than 30% of T2DM patients, which is linked to poor glycemic control and high death rates (Reach, Pellan, & Crine, 2018). Medication adherence requires a high level of health literacy. It is a person's ability to navigate fundamental health information in order to make an informed health decision (Huang, Pecanac, & Shiyanbola, 2020).

Barriers to medication adherence among diabetic patients are worries about the safety of their treatment and feeling overwhelmed by the excess number of medicines to be taken which acts as situational influence rendering medication-taking as routine (Bernhard et al., 2017). Nonadherence is caused by the high expense of health care and the intricacies of pharmaceutical regimens (e.g., multiple dosing, large pill load, injectable meds) (Gellad, Grenard, & Marcum, 2011).

Facilitators of medication adherence include good patient-healthcare provider communication which boosts the patient’s confidence in their capability to deal with their illness which improves adherence (Schoenthaler et al., 2012). Individual' who are religious are found to integrate their diabetes management behaviour with the daily rituals they perform (Hatah et al., 2015). Family support facilitates medication behaviour by assisting in administering medications. (Vongmany et al., 2007) Through better health behaviour and disease management, general intelligence reliably predicts a range of health outcomes. (Gonzalez, Tanenbaum, & Commissariat, 2016).

Role of Health Behaviour Change Models in Achieving Adherence

Regardless of one's perceived health status, health behaviour refers to any action people engage in to preserve or improve their health (Fassier et al., 2019). Individuals with diabetes are required to perform these behaviours to prevent further complications arising from the disease and having a normal glycaemic index. Health behaviour change theories help to understand why people do or do not practice health promoting behaviour and identify what information is needed to design an operative intervention strategy.

Protection Motivation Theory (PMT)

This theory explains the behaviour of individuals who feel threatened with their current health status. It assumes that the individual's intention is to protect health and embrace health protective behaviour. *Protection motivation* depends on two types of appraisals namely *threat appraisal* and *coping appraisal*. *Fear* is the cognitive mediating process which is the emotional response triggered by the sources of information.

Taking the inputs from environmental and intrapersonal resources, the individual assesses the *severity* and *susceptibility* of the health condition which together constitutes the *threat appraisal* along with the *reward* which is the factors that reinforce the sustenance of status quo. The *coping appraisal* is a combination of *response efficacy* (expectancy that the recommended behaviour has the potential to protect them from the health condition) and *self-efficacy* (a person's belief in their capability to execute a particular behaviour) these efficacies are compared with the *response costs* which refers to the evaluation of gain or loss in initiating or terminating a behaviour compared to maintaining the status quo. According to this theory, individuals are more driven to alter their behaviour if they are threatened by the consequences of not engaging in that behaviour. (Hariharan, 2020)

In relation to diabetes, PMT can be used to increase awareness of diabetes by reinforcing the perceived threat and the importance of timely diagnosis to prevent the severity of the illness. Improving the individual's capacity for the uptake of health promoting behaviour by emphasizing the response costs and rewards.

Health Action Process Approach (HAPA)

It is a social cognitive model that predicts changes in behaviour. It proposes that adoption, initiation and maintenance of health behaviour must be regarded as a process that entails a *pre intentional motivational phase* and a *post intentional volitional phase*. Risk perception, which indicates the perceived health-related threat that is required to mobilise action, affects intentions to adopt behaviour in the former. The sense of benefits achieved by adopting the behaviour is referred to as outcome expectation. Action self-efficacy is an individual's belief in his or her capability to perform a new behaviour. The action planning phase is introduced to the model as a link between intention and behaviour in the volitional phase. These refer to the when, where and how plans turn the goal into action. Once the action has been initiated, the individual then has to maintain the new behaviour, this stage *coping self-efficacy* is importance to success which is the belief in one's ability to overcome temptations which enhances resilience and contributes to greater persistence. If the individual suffers setbacks, *recovery self-efficacy* helps them get back on track. (Hariharan, 2020)

In the background of Diabetes, intentions to live a healthy life led to an increased likelihood of following action plan, and using anticipatory coping. This is contingent on perceived ability in following the behaviour such as eating more healthier and going for a jog every morning (maintenance self-efficacy) and in coping post any behavioural lapse such as having desert during a festival (recovery self-efficacy).

Self Determination Theory (SDT)

Postulates that an individual has three psychological needs which are *autonomy, competence* and *relatedness.* Adoption and maintenance of any health behaviour depends on the satisfaction of these needs which contribute to the psychological growth of the individual.

Individuals can be classified on a motivational continuum spanning from amotivation to intrinsic motivation, according to SDT. *Amotivation* is when there is no intention to act. *External regulation* is when an individual performs an action to gain a reward and avoid punishment. *Introjected motivation* is a type of controlled motivation in which behaviour is driven by self-imposed agreements such as avoiding guilt or earning contingent self-esteem. Identified motivation is based on what is valued personally. *Integrated motivation,* is when the outcome of a given behaviour align with an individual's broader sense of self. *Intrinsic motivation* is when the worth of behaviour is fully internalized, and the motivation to execute the behaviour is fully autonomous (self-determined).

With reference to diabetes, being intrinsically motivated can lead to the uptake of physical activity and medication adherence especially if the health care environment is autonomous by giving rationale for behaviour change and acknowledging the patient's feelings. Controlled motivation can improve self-care behaviour among individuals who are newly diagnosed with diabetes.

Information Motivation Behaviour (IMB)

Information, motivation, and behavioural skills are the three parts of the behavioural transformation process that are covered by the theory. Theoretically, information is the foundation for change and action.

Personal motivation denotes patients' outlooks toward health behaviour, whereas social motivation is founded on perceptions of societal standards and social support for behavioural change. Patients' objective skills and self-efficacy are referred to as behavioural skills. (Fisher, Bryan, & Misovich, 2002).

Articulated to diabetes self-care behaviour, the information construct includes correct knowledge about particular diabetes self-care behaviours or erroneous heuristics such as (only taking medications when my blood sugar is high). Personal motivation to adhere is based on one's beliefs that not taking medications as prescribed would have undesirable consequences. Adherence incentive is based on one's beliefs of societal norms that support adherence. Behavioural skills include perceived abilities to have access to medications as directed across situations.

Motivational Interviewing (MI)

It's a directive, client-centred counselling method whose objective is to help people uncover, explain, and resolve ambivalence to change while also strengthening their inner motivation. (Miller & Rollnick, 2012).

The purpose of MI is to diminish patients' perception of their own disability. The counsellor facilitates this process in setting realistic goals for behavioural change. The principles of MI are *Expressing empathy* (informing individuals of their abilities and accepting them for who they are), *developing discrepancy* (increasing the difference between current and intended behaviour), *rolling with resistance* (reflective listening to the failures of the individuals), and *supporting self-efficacy* (evaluating the past successes of patients).

MI intervention is helpful for diabetes when individuals focus on agenda-setting (exercising regularly). Allowing patients to describe a 'typical day' handling their illness.

Discussing the 'journey of change' and evaluating their level of confidence when thinking about making explicit changes (Channon, Huws-Thomas, Gregory, & Rollnick, 2005)

Acceptance and Commitment Therapy (ACT)

It is a synthesis of acceptance and mindfulness methods with commitment to behaviour change. The goal of this therapy is to increase psychological flexibility. The treatment uses six basic processes which are; *i) Acceptance* which is allowing all experiences to exist without trying to alter them *ii) Cognitive Defusion* helps to creates a space between the individual and unpleasant thoughts and feelings to help them cope better. *iii) Being present* is being mindful of what is happening without trying to change the reality however worrisome it is. *iv)* The concept of the *self as context* asserts that an individual is more than the sum of their experiences, thoughts, and feelings. It proposes an alternate concept of a self, existing outside of present experience. *v) Values* refer to activities that give meaning to our life. *vi) Commitment to action* is a long-term goal which is living life consistent with the chosen values.

ACT applied to diabetes teaches individuals to accept the feelings which comes with the complexity of the illness. By focusing more consciously on the process of thinking and linking this to goal-based activity, people can "defuse" or uncouple from the substance of their ideas. This can occur when people with diabetes have accepted the consequences that come with the illness and are ready to make necessary changes in their life to improve their health rather than trying to alter or stop them.

Unlike the above 5 techniques, ACT is not a behaviour change theory or intervention but is aligned more towards the positive psychological principle of mindfulness. This therapy

is relevant in this context because unless individuals are completely in terms with who they are, they will not commit to the process of change.

Review of Literature

Several factors affect the adherence to dietary, exercise and medication regimen in people with diabetes, the purpose of this review is to identify the cause and consequence of adherence along with interventions to promote the same.

Dietary Adherence

Dietary adherence is important to maintain body weight and regular glycaemic control. A study conducted by Amankwah-Poku (2020) explored the cyclical nature of adherence and the negative emotions that arise from poor dietary self-care. Maintaining a prescribed diet was found to be challenging due to perceived restrictiveness. This finding corroborates with previous research where women with T2DM reported they couldn't freely eat what they wished to (Peres et al., 2008), even when the physicians communicated that they could consume them in control (Mathew et al., 2012). Berengura et al., (2016) in understanding the experiences of people with diabetes found that, after diagnosis, respondents wanted to eat more of the prohibited food, and had a hard time sticking to calorie count. They were reluctant to follow the prescribed diet by reasoning that their family member who never ate this way lived a long life. Social and work situations make them compelled to eat certain foods that are not part of their recommended diet which led to feelings of guilt after consuming the item and consequently exercising more the following day or increasing their dosage of insulin. Self-efficacy determined adherence in maintaining self-care activities (Lee et al., 2019) such as food selection, and controlling food portions, and maintaining set mealtimes.

A study conducted by Hentschel et al., (2017) on diabetic patient's diets on Indian households through semi structured interviews found that the daily routines advocated by doctors to the patients were considered unrealistic. This is because doctors provided dietary advice addressed to the patient rather than the spouse who controls the kitchen. Spouses understand the importance of a patient's diet choices in diabetes care and support their partners in following healthy dietary recommendations (Franks et al., 2012). They mostly focus on what not to eat rather than what can be incorporated in their diet to be healthier whereas, participants were looking to find constructive suggestions on what to eat.

Exercise Adherence

Exercise has been found to lower blood glucose levels and boost the body's sensitivity to insulin. Lawton et al., (2006) have identified interweaving factors which influence physical activity amongst Pakistani and Indian patients with T2DM. These were pressures to work long hours, along with obligations to kin that place constraints on people's time. For women, their movements outside the home were curtailed by social rules and an absence of a culture to exercise. Research highlighted fatalism to be common among participants with an external locus of control who perceive themselves to have no control over their exercise routines.

Pansu et al., (2019) evaluated the effectiveness of a norm-based program where the participants voiced their salient norms with reference to physical activity which increased their commitment. Tulloch et al., (2013) found that social support was in the top three facilitators for exercise maintenance, where in some cases the family member performed the exercise along with the participant. Having access to a personal trainer and achieve future health benefits (i.e., outcome expectations) in terms of improved fitness contributed in a sense of well-being to continue participation in the exercise trial.

Kadariya and Aro (2018) in a study of exercise behaviour in Nepal found that 79% of the respondents believed that diabetes had negative consequences. And, 63% of them believed that they there was at risk of further complications due to the illness. These factors acted as reinforcers in the respondent's approach towards physical activity. Thomas, Alder and Leese (2004) saw that as people age, the burden of multiple chronic conditions, prevents them from being physically active.

Medication Adherence

Nonadherence is a multifactorial problem that reflects interactions between patients, health care providers, and the health care system, as well as the specifics of the condition and its treatment, as well as broader socioeconomic factors, according to a landmark report by the World Health Organization (2003). Patients with diabetes have a medication adherence rate that ranges from 36% to 93 percent over the world. (Wabe, Angamo, & Hussein, 2011).

Mogre et al., (2019) discovered that the patient's attitude influenced the continuity of treatment, where assumptions that they were cured, made them discontinue the treatment which led to deterioration of the conditions. Shoemaker and Ramalho de Oliveira (2008) found the unremitting nature of chronic illness make patients feel they were being kept captive by their medicines. High prices of medication that is not covered by insurance is a barrier to medication adherence (Huang, Pecanac & Shiyanbola, 2020).

Giugliano et al., (2018) highlighted clinical inertia which is the failure of the doctor to initiate and intensify the treatment, when necessary, as an indicator to show the non-fulfilment of glycaemic targets. The longest delays were reported for initiation of insulin which led to a frustration of failing target. The opposite of it was reverse clinical inertia which was failure to reduce therapy when no longer needed which were associated with

adverse effects of treatment. Both of them led to medication non-adherence because of a lack of assessment of severity by the health care providers.

Mogre et al., (2019) found that providers who create an empathetic environment elicit behaviour change and medication adherence. The study also revealed, many patients struggle to understand what their doctors are saying to them, yet are hesitant to tell their doctors. Patients with limited health literacy experience even more reluctance.

Huang, Pecanac and Shiyanbola (2020) using explanatory sequential design found that, when the treatment involved simple regimens, patients achieved internal control of taking medications as prescribed. Referring to the information on the medication bottles and keeping medication at a particular spot acted as an external cue made medication taking easy. They were prepared for emergencies and took their medication plan along with them and, modified their regimen according to their priorities. Some patients used strategies to manage their medication regimen where they activated their support networks. This assisted in receiving experience-based knowledge on their condition which increased patient centeredness and responsiveness of health care services (Nickel, Trojan, & Kofahl, 2012).

Rae and Green (2016) saw that life experiences strengthen the importance of medications for diabetes management due to fear of diabetes-related complications after knowing about other individuals' experiences of managing the illness. People believed that remaining well allowed them to spend more time with their families.

Berengura et al., (2016) used Levinthal's self-regulatory framework where the perception of threat to an individual's health creates cognitive representations to regulate the illness to understanding illness experiences of people with diabetes. They found a mental block upon patient's receiving the diagnosis of diabetes which was curbed with the doctor's

reassurance on the simple nature of the procedure. Their cognitive representations made them feel better about the diagnosis by attributing its cause to external factors such as genetics and stress.

Pati et al., (2020) found patients who kept track of their previous medical treatment were more mindful of their health. They thought this was beneficial in avoiding duplicate testing and staying on track with their treatment plan, and they were more aware of their symptoms as a result.

Protection Motivation Theory (PMT)

Dashti, Dabaghi and Tofangchiha (2020) study presented the effectiveness of the structures of Protective Motivation Theory in determining compliance to diet and Physical Activity (PA) among military personnel with diabetes. Initially, perceived cost and rewards were high and the fear score was low than the rest of the structures. Following the intervention, the results revealed a relationship between coping appraisal and threat appraisal with the intention to follow a diet plan, where the former indicated a greater intention. This finding is in line with Morowatisharifabad et al., (2018) where the association between PMT structures and intention was different, where the strongest correlation was found between intention and self-efficacy, whereas the weakest was found between perceived severity and intention.

Diabetic patients had a higher threat appraisal regarding non-compliance to diet and physical activity and their assessment of the adoption of these activities increased their intent in the intervention-based motivation group. The protective motive group had a greater decrease in BMI than the control group, according to the findings of this study. (Turner et al., 2018)

Health Action Process Approach (HAPA)

When Ranjbaran et al. (2020) used HAPA to investigate medication adherence among diabetic patients, they discovered that different sorts of self-efficacy were necessary as persons progressed from one phase to the next (Plotnikoff et al., 2014). Task and coping self-efficacy help people recover faster and stay committed to their goals. In diabetes patients in the volitional phase, coping planning had a critical influence in medication adherence. The findings revealed the importance of self-regulatory mechanisms (such as planning) in achieving goals.

MacPhail et al., (2014) used intervention based on HAPA to improve health outcomes among diabetic patients and found that HAPA variables were independently relevant in predicting health outcomes. Diabetes discomfort is predicted by task self-efficacy, indicating that those who are confident in their ability to begin a healthy habit are less bothered by their illness. Blood glucose level was predicted by coping self-efficacy, while purpose was the only predictor of blood pressure. This was surprising because prior studies had demonstrated that intention is a key predictor of health behaviour. The "intention–behavior gap" is one explanation for the lack of health outcome prediction. If healthy eating goals aren't followed through on, it's doubtful that flow-on benefits to physical health outcomes would be seen, especially for longer-term outcomes like blood glucose levels. (Sheeran, 2002).

Rohani et al., (2018) in understanding the psychological factors of healthful diet promotion using HAPA found that action self-efficacy was an important predictor of healthy diet in the volitional phase. This warrants in creating interventions that detail an on how to build on action self-efficacy which is having peer support models and providing instances for beginners to try healthy foods leading to creation mastery experiences (Mullan, Wong & O' Moore, 2010). Due to the low life expectancy of diabetes patients, outcome expectations displayed a negative relationship with intentions to follow a healthy diet.

Self Determination Theory (SDT)

Koponen, Simonsen and Suominen (2019) investigated intake of fruits, vegetables, and berries intake (FVBI) among patients with type 2 diabetes using SDT and found female gender and autonomous motivation were the strongest determinants of FVBI.

Koponen, Simonsen and Suominen (2018) studied the success in weight management using SDT variables among diabetic patients via a mail survey and found that individuals who successfully managed their weight were more autonomously motivated. The results of this study are in line with (Teixeira et al., 2012) who emphasized that lasting behaviour change occurs when an individual personally values the behaviour. Internalizing the importance of effective diabetic self-management was revealed to be a critical element in long-term health behaviour modification.

Karlsen et al., (2018) provide new insight into the experiences of adults with T2DM who participated in a nurse-led Guided Self Determination (GSD) training programme (empowering self-determined goals and competence building among people who have problems in managing diabetes). During the course of counselling participants developed reinterpretation of living with the illness that enhanced their ability to recognize the perceived benefits in taking the illness more seriously. This suggests that counselling initiates the internalisation process, in which participants attempt to integrate the external effect of the counselling into more autonomous regulated behaviour. (Deci & Ryan, 2000**).** Moser, van der Bruggen and Widdershoven (2006) demonstrated that shared decision making is a central component in stimulating the autonomy of patients and that participants became self-determined by support through positive feedback from an external influence. This reflects the need for belongingness.

Seberie et al., (2018) investigated the types of motivation for lifestyle change in adults newly diagnosed with T2DM in a qualitative study. Participants with controlled motivation experienced frustration due to the slow progress in achieving goals (e.g., weight loss). Diabetes diagnosis offered an opportunity for individuals to find meaningful intrinsic goals (e.g., health or family time). Integrated motivation was observed to have developed over time and the internalisation was supported by factors such as having a positive attitude and being resilient (Miquelon, Chamberland & Castonguay, 2017). The study found that even self-regulated participants wanted professional help to stay on track.

Information Motivation Behaviour change model (IMB)

Yao et al., (2020) using the IMB intervention to improve resilience and quality of life among diabetics found that the program aided in establishing the right concept of treatment effect while also clarifying the role of the individual in the treatment process. It assisted them in rationally planning their daily regimen that surrounded managing their illness (Lee et al., 2019).

Osborne et al., (2010) applied the IMB model to conceptualize the determinants of diabetes self-care behaviour. They saw diet-related information and motivation were associated with behavioural skills, which in turn were linked to A1C levels. The results indicate that the individuals must be equipped with the necessary behaviour skills to satisfactorily perform a specific diabetes self-care behaviour.

Jeon and Park (2019) developed a self-care app based on the IMB principles designed for people with diabetes. The app proved to be effective in promoting self-care behaviours such as monitoring blood glucose levels which was done via a wireless glucometer interface that received data and alerted the participant. Social motivation was utilized by introducing of

a bulletin board to share diabetes self-care experience and express empathy with other participants.

Motivational Interviewing (MI)

Parizad et al., (2020) demonstrated that the MI approach through evaluation of commitment-confidence, participation in decision-making, supporting the autonomy of the clients and drawing attention to change positively influenced the nutritional self-efficacy in patients with diabetes.

Celano et al. (2019) created a 16-week Positive Psychology–Motivational Interviewing strategy for diabetes patients that was delivered over the phone. Structured exercises (e.g., recalling joyful events, maximising personal strengths) were employed in PP interventions to increase the frequency and intensity of positive moods. The combination of these two interventions allowed to achieve superior health outcomes.

Channon et al., (2005) found Agenda-setting to be a beneficial technique for patients to choose a salient issue that they are able to tackle with the help of a practitioner. A specific agenda aided in the structuring of consultations and the incorporation of the patient's particular goals, resulting in a more concrete action plan. Clinicians who have been trained in MI have been found to have a positive impact on patients' understanding of diabetes, treatment beliefs, and motivation for behaviour change (Rubak et al., 2005)

Acceptance and Commitment Therapy (ACT)

Gregg et al., (2007) in their intervention to improve acceptance, mindfulness and values among diabetic patients from a low SES background found improved self-management was mediated by diabetes related acceptance. Initial emphasis on acceptance facilitated later actions based on the values, which in turn improved performance which was

attained by inculcating the psychological resources to manage the disease. This is in line with Shayeghian et al., (2016) who reported that a combination of diabetes management training and acceptance and commitment therapy increased psychocognitive flexibility of patients by improving coping strategies, self-care, and glycosylated haemoglobin level, 3 months after the intervention (Hadlandsmyth, White, Nesin & Greco, 2013). Similarly, Rosenzweig et al. (2007) showcased the efficacy of mindfulness training in reducing blood sugar among diabetic patients from low SES who had significant difficulties in obtaining complex and frequent forms of care.

Abdollahi, Hatami, Manesh and Askari (2020) showed that acceptance and commitment therapy influenced the self-care and adherence to treatment of diabetic individuals by learning to accept their momentarily experience actively (Chin & Hayes, 2017). They learn to specify the values, goals, barriers impeding goal achievements, and requisite actions for fulfilling the goals. Then, they are committed to behave or act in accordance with their selected values.

The above studies elucidate the emotional, cognitive and behavioural aspects of adherence and how intrapersonal and interpersonal factors can act as barriers and facilitators. The health behaviour change theories have been used to target different problems associated with diabetes.

Conclusion

The review elaborates on the various factors responsible for acting as a hinderance to adhering to a specified regimen for diabetic patients. Some of which include poor illness cognition, where the individual has a distorted perception of the illness, improper doctor patient communication, and the individual unable to make changes in their established habits.

Factors promoting adherence include having a strong social support network where family and friends act as a protective factor against the adverse effects of diabetes. Taking achieving glycaemic control as a challenge and being highly motivated and resilient during setbacks. A cardinal reason of being able to follow a regimen, is having high self-efficacy. This is the major goal of all the health behaviour theories. These theories focus on the cognitive aspect of the individuals to change their belief and perception and increase motivation to take action and implement the necessary changes in their life. This is done by highlighting the risks of continuing a health compromising behaviour and the benefits of adopting and maintaining health promoting behaviour.

When the person feels threatened by the illness, Protection motivation theory has been shown to increase the uptake of healthy diet and exercise. When an individual turns intention into action using planning, HAPA has been used for the individual to regulate blood glucose levels. By internalizing motivation, self-determination theory is seen to predict increased cooperation with the required guidelines. The interaction of information, motivation and behaviour skills helped determine adherence for complex behaviours. Motivational interviewing by targeting ambivalence helped in weight management and the utility of Acceptance and commitment therapy is shown in developing interventions for individuals from a low socio-economic background.

Most of the above-mentioned interventions measured the progress made by the individuals after a short duration (3 to 6 months). But these failed to indicate if the intervention provided a lasting change among the population.

India is seen to have the second highest incidence of diabetes and it is therefore vital to take steps to help in prevention. However, it can be observed that although many Indian studies have quoted health behaviour models, very little research has been conducted in this

respect. Therefore, future studies can focus on implementation of these models' using interventions in the health care setting.

As doctors and patients have differing perspectives on illness and treatment, communication and relationship-building are inhibited. Patients were more concerned with their sickness experience, whereas clinicians were more concerned with the physiological components of a disease and how to manage it. It can be seen that doctors do not address the mental health and quality of life of the patient.

Most of the health care providers, use a "one size fits all" approach. This may not be helpful because of contextual factors such as socioeconomic status and complexity of the treatment regimen. When collaborating with the patient, it is important to gain an accurate insight into their understanding of the illness to provide the necessary recommendations to achieve adherence. As, doctors have limited time to interact with the patients, the role of a health psychologist becomes increasingly important. Having a health psychologist as part of the health care team can not only prove to be very useful but is also required, especially keeping the Indian scenario in mind. Health psychologists assess the patient's psychosocial status and deliver cost effective interventions which are beneficial, practical and manageable for patients by applying their behaviour change skills.

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