Mobile Health Applications For Chronic Disease Classification

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Abstract

The mobile app has a critical role in delivering counselling services for some of the chronic disorders throughout pregnancy. The research seeks to create and test the mobile app for chronic disease management and patient counselling throughout pregnancy to optimize the safety and efficacy of drug use. This was a prospective intervention study in Obstetrics and Gynaecology. 195 patients were enrolled and screened for GDM and hypothyroidism. Mobile application was made using Sketch ware app. This was an educational app, created for pregnant women with diabetes or hypothyroidism. The purpose of this APP was to generate the awareness of Gestational Diabetes Melitus (GDM) and Hypothyroidism among pregnant women and it can also be helpful for other health care providers. Drug Utilization Evaluation and screening techniques were also compared. The study provides an example of how pharmacist is an integral component in enhancing KAP towards disease control. Statistically significant relationships were observed for education with levels of knowledge, concern, and precautions adopted in intervention group. Enhancing levels of KAP enhance positive clinical results and averts complications related to chronic diseases during pregnancy. The research displayed how mobile app is a part of disease management.
Keywords: mobile app, patient, chronic disease, management.

INTRODUCTION

Chronic illnesses in pregnancy have an immediate effect on maternal and fetal outcome. Various epidemiological surveys were done on reproductive outcomes as a consequence of chronic illness in pregnancy [1]. Findings of the studies revealed that the raised risk of Caesarean section, low birth weight fetus, preterm delivery, Less Apgar score, birth defects, intrauterine growth retardation, and in some instances demonstrated the stillbirth, maternal and neonatal mortality. The rate of maternal diseases increased from 3.71% to 15.76%, all age groups of mothers were depicted with rising prevalence. Gestational diabetes mellitus and hypothyroidism were some of the frequent chronic disorders during pregnancy noted in the study articles [9]. It is important to treat GDM early since left untreated, they can quickly deteriorate and be life-threatening to mother and baby. GDM women must have a healthy diet and exercise in their schedule. Regular daily monitoring of blood glucose level as part of their routine practice. Medical Nutrition Therapy (MNT) and exercise (30 mins/d for 2 weeks was the first-line therapy for GDM. GDM women, after 2 weeks of non-pharmacological intervention, had postprandial blood sugar (PPBS) determination prior to treatment. Pharmacotherapy was recommended to patients of GDM according to PPBS values. Based on current recommendations, metformin or insulin therapy needs to be prescribed in addition to them for those women whose 2hr PPBS value exceeded 120mg/dL[2]. In pregnancy, hypothyroidism was induced due to failure of the thyroid gland to synthesize sufficient hormones [3].Though the studies among pregnant women with chronic illnesses have brought about numerous developments underlying prevalence, treatment methodologies, etc., there remain several questions without an answer[4]. Researchers have determined the rate of prevalence of these disorders during pregnancy to a great extent[6]. Based on their findings, it is illustrated that prevalence is on the rise globally. Researchers have already developed pregnancy with diabetes mobile apps to provide safety to pregnant women, but they lack the medication counselling feature as per the present situation[8]. A pharmacist plays an important role in enhancing drug use safety and efficacy. They are offering patient counselling services for better health outcomes[10]. The integration of treatment and patient counselling via the mobile application will be the ultimate objective in a bid to evade maternal and fetal

complications[12]. The primary purpose of this research was to design and examine the effects of mobile applications among pregnant women with GDM and hypothyroidism. Improving patients' quality of life matters, which could be ensured through minimizing disease-condition risk factors and with suitable patient counselling[14]. Treatment outcomes and patients' quality of life in cases of GDM and maternal hypothyroidism were the overall outcome of this present clinical study to be achieved by determining how mobile apps and patient counselling conducted by a pharmacist influence the condition. Through such improvement, patient knowledge, practice and attitude improve [13].

REVIEW OF LITERATURE

Pregnancy is a state where the fetus grows within the womb of the mother. Metabolic activity was higher in this phase. Keeping the glucose and thyroid level at most is the most important criterion. Pregnancy is categorized into 3, first, second and third trimester, each trimester was around 3 months. Complications of pregnancy can be severe vomiting, high blood pressure, gestational diabetes, etc. Chronic illness in pregnancy has a pending effect on maternal and fetal outcomes [5]. Multiple epidemiological surveys were done across reproductive outcomes because of chronic illness in pregnancies. Findings from the surveys indicated that the risk of increased caesarean section, low birth weight baby, preterm labor, variation in Apgar score, birth anomalies, intrauterine growth retardation, and some had an indication of stillbirth, maternal and neonatal mortality. The rate of prevalence of chronic diseases in pregnancy was raised from 3.7% to 15.8%. All maternal age groups were reporting growing prevalence. The onset of hypothyroidism and diabetes was more frequent during pregnancy.GDM is defined by the presence of chronic hyperglycaemia throughout gestation. Hyperglycaemia resulted from βcell dysfunction and insulin resistance. These are the key elements illustrating the pathophysiology of GDM. In order to meet metabolic demand during pregnancy, βcells hypertrophy and hyperplasia occur in normal pregnancy. An increase in the blood sugar level was because of insulin insensitivity. When the stage of pregnancy advance, glucose levels in the blood revert to the normal levels. At the time of GDM, the compensatory mechanism of βcells may be suspended, due to which hyperglycaemia occurs. Insulin secretion and storage were regulated by βcells, according to a glucose load. The transport rate of glucose into a particular cell of the body was regulated by Insulin. If βcells are unable to release sufficient amounts of insulin or to properly detect blood glucose concentration, this is referred to as βcell dysfunction. Insulin production would be delayed to satisfy the requirement of long-term fuel excess that could culminate in βcell failure. Complications of GDM can be spread across multiple organs and systems of the body. The principal organs are the liver, brain, placenta, and fat tissue. Basal metabolic rate, energy expenditure, and appetite can be regulated by a neurohormonal mechanism. Central and peripheral signals both contribute to this mechanism. Cognitive and visual effects were regulated by cortical centers and hunger hormones were regulated by peripheral signals. Neurohormonal dysfunction existed in GDM women [11]. Neurohormonal dysfunction in women with GDM could change glucose metabolism and adiposity. Are protein secreted by the adipose tissue for cell signalling function and also controls the neurohormonal mechanism. Leptin suppresses appetite and enhances energy expenditure by affecting the neurons with the nucleus of the hypothalamus and suppresses appetite-stimulators neuropeptide Y (NPY). Hyperleptinemia is one of the most important factors in GDM patients due to leptin resistance.

MATERIALS AND METHODS

Because of its great effectiveness, affordability, and convenience of use, mobile technology has become widely accepted for the management of chronic diseases. This trend has been intensified by the COVID-19 pandemic, since patients have had difficulty receiving traditional in-person medical care. The World Health Organization (WHO) defines mHealth as the use of wireless and mobile devices to improve healthcare management. It makes use of technologies like wearable biometric monitors/sensors, laptops, tablets, personal digital assistants, and mobile phones to facilitate information and communication in healthcare interventions. By improving the quality of patient care, fostering relationships between patients and providers, and encouraging improved health outcomes, mHealth interventions present a possible substitute for traditional clinical practice. It has been demonstrated that these interventions enhance the management of chronic illnesses, lowering the financial and health costs for individuals as

well as for society at large. Patients, healthcare professionals, health system administrators, and data services can collaborate more successfully to enhance health outcomes throughout the course of a condition by utilizing mHealth. Through communication networks, mHealth technologies allow for the time- and location-independent management of a variety of chronic diseases. Research has assessed the effectiveness of these technologies for conditions like cancer, diabetes mellitus, chronic respiratory diseases (like COPD and asthma), cardiovascular diseases (CVD), chronic kidney disease (CKD), and chronic skin diseases (like psoriasis and atopic dermatitis). Promising options for treating chronic illnesses and enhancing patient outcomes are provided by these technologies [7].Clinical outcomes (e.g., biomarkers, readmission rates, symptom measurement, quality of life), self-efficacy outcomes (e.g., medication compliance, lifestyle change, patient activation), and economic outcomes are some of the outcome measures used to evaluate the impact of mHealth interventions on chronic disease. In order to provide medical treatment remotely and improve patient management and support, these interventions frequently make use of telecommunication capabilities such phone services, mobile messaging (SMS, MMS), interactive voice response, and teleconferencing. SMS, in particular, is a well-researched and successful mHealth strategy for managing chronic diseases worldwide. Drug compliance, lifestyle change, self-management, and attendance are all made easier by its affordability, accessibility, and convenience. Furthermore, real-time teleconsultation using social media or video conferencing allows patients to communicate with medical professionals from a distance, enhancing their relationship and enhancing patient results.
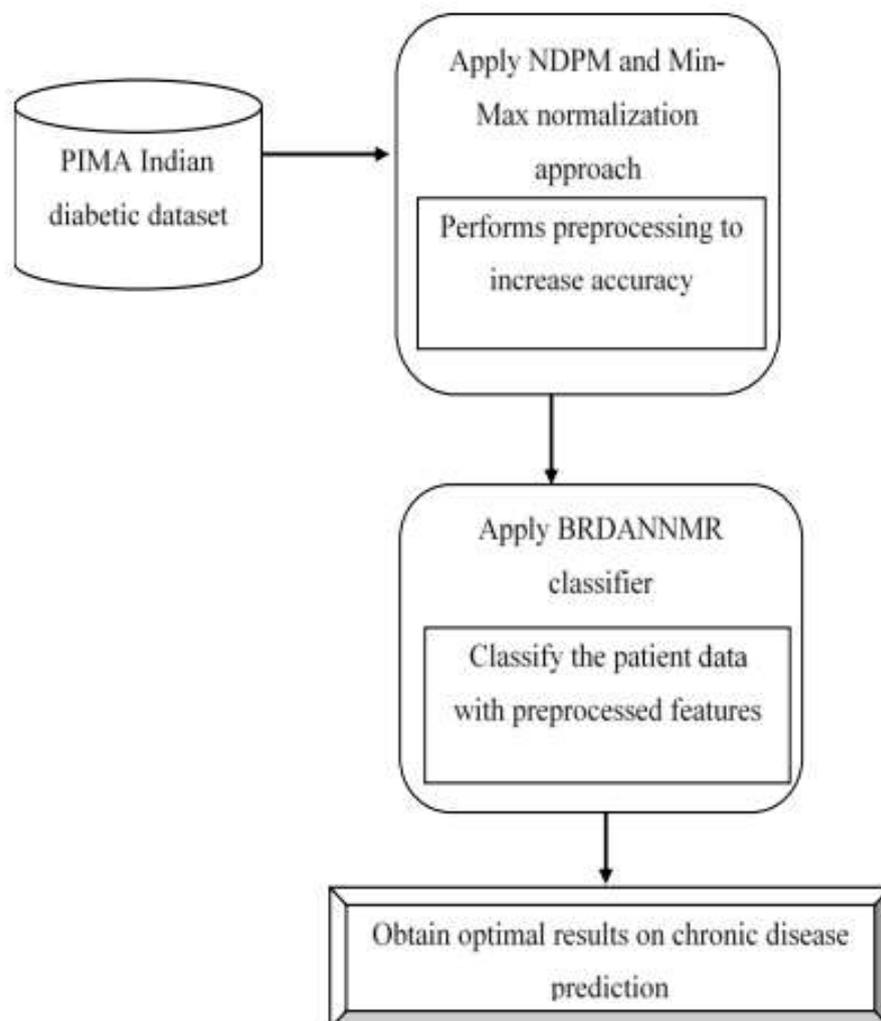

Figure 1: Overall Process

In order to provide valuable insights into patients' health during daily activities, wearable mHealth devices—such as smartwatches, earphones, and glucose-sensing lenses—allow for the unobtrusive, non-invasive, real-time monitoring and recording of patients' vital signs and physiological data, including temperature, blood pressure, pulse and respiration rate, oxygen saturation, blood glucose, electrocardiogram (ECG) tracing, cardiac output, physical activity level, and sleep pattern. By integrating mHealth technology to manage particular clinical problems, patients can communicate clinical pictures or health data using wearable sensors, smartphone apps, or web-based systems that connect to electronic monitors. After evaluating and interpreting the data, medical professionals or computer programs offer comments and guidance via direct consultation (over the phone or in person) or electronic channels (email, mobile messaging).

RESULT AND DISCUSSION
Asthma and COPD are examples of chronic respiratory conditions that need constant medical attention. Self-management can be improved with mHealth interventions, increasing clinical efficacy. With features like self-monitoring, personalized feedback, and patient education to improve disease management, there are more than 300 mobile apps available for people with COPD. A recent study found that a multi-module pulmonary rehabilitation program for COPD patients delivered via WeChat was not inferior to face-to-face interventions in improving health-related quality of life, dyspnea, and self-efficacy, highlighting the potential of mHealth interventions to effectively manage COPD and enhance patient outcomes [15].
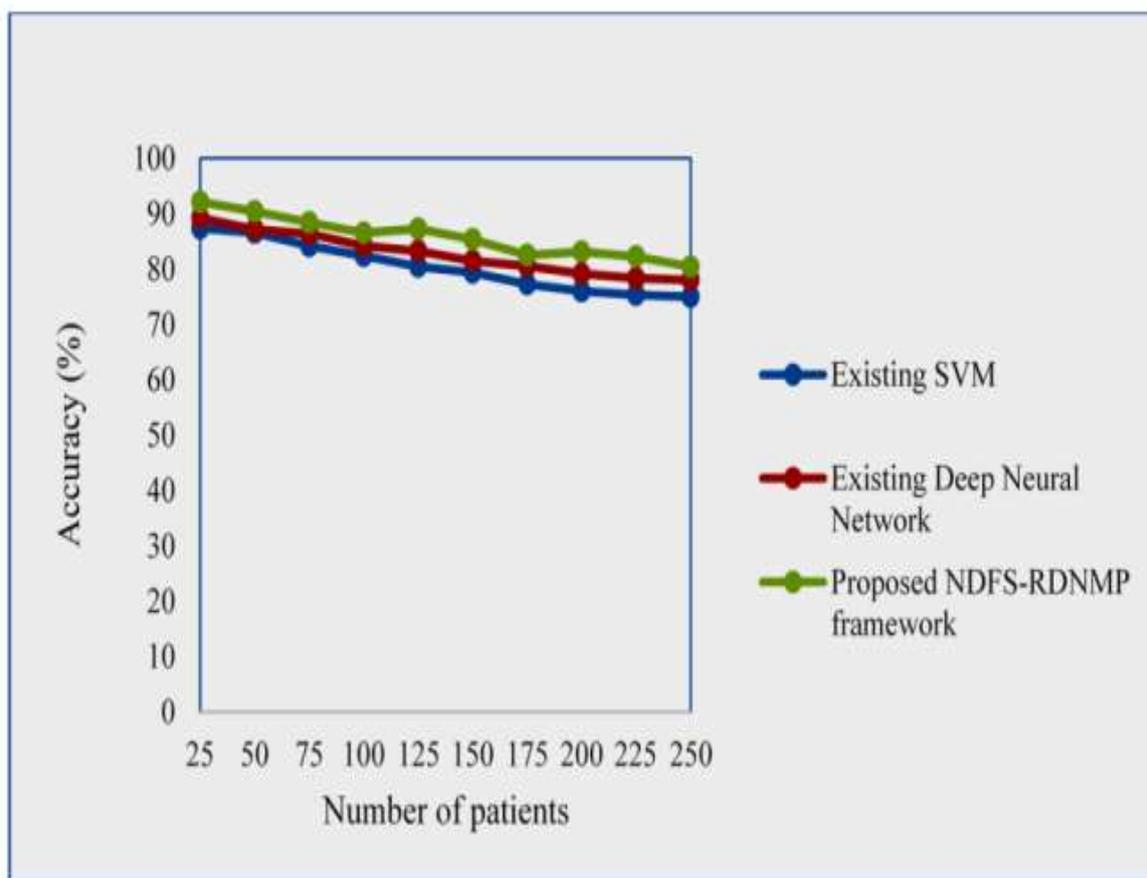

Figure 2: Accuracy comparisons with proposed framework

Glucose monitoring is the main emphasis of mobile health (mHealth) programs for diabetes management, which allow for remote tracking and prompt interventions. Transdermal patches, wearable sensors for continuous blood glucose monitoring, and glucose-sensing contact lenses are some of the technologies that help medical practitioners provide individualized care. When compared to conventional treatment, mHealth interventions—such as telemedicine, mobile apps, and hybrid models—have demonstrated

efficacy in improving glycemic control in patients with diabetes, providing prospective avenues for improved patient outcomes and diabetes management.
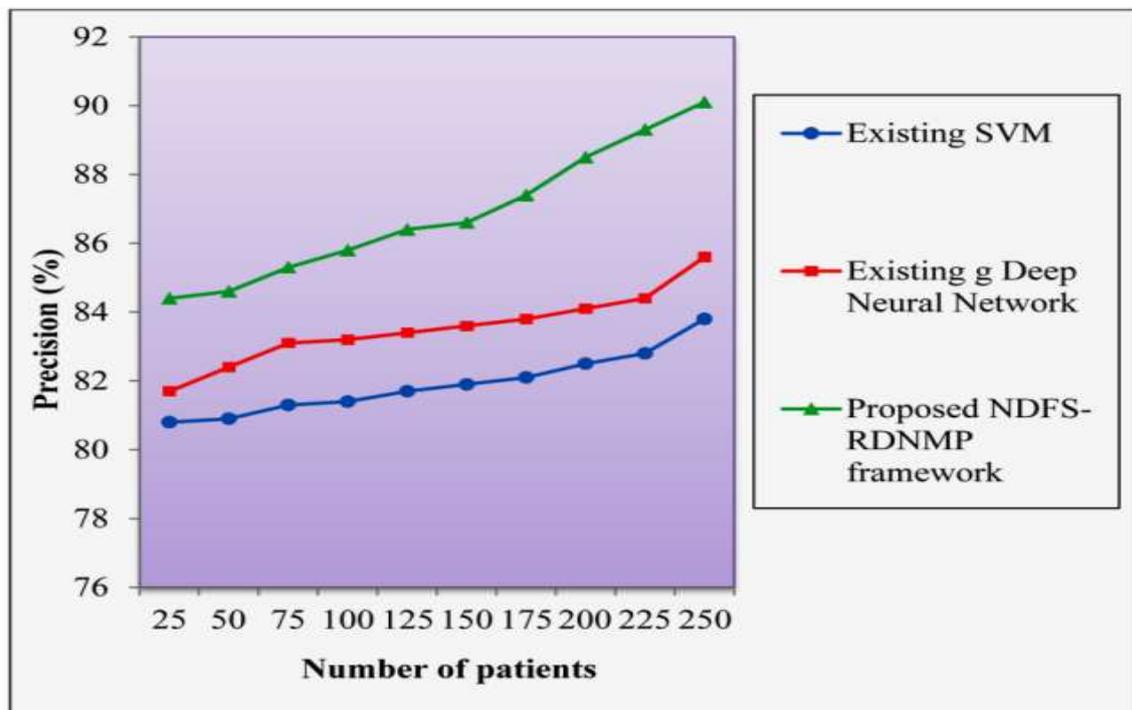

Figure 3: Precision comparisons with proposed framework

Cancer survivors gain from telehealth therapies because they reduce daily life disturbances, increase personal care participation, lessen the burden of therapy, and offer real-time monitoring and support, all of which improve patient outcomes and experience.
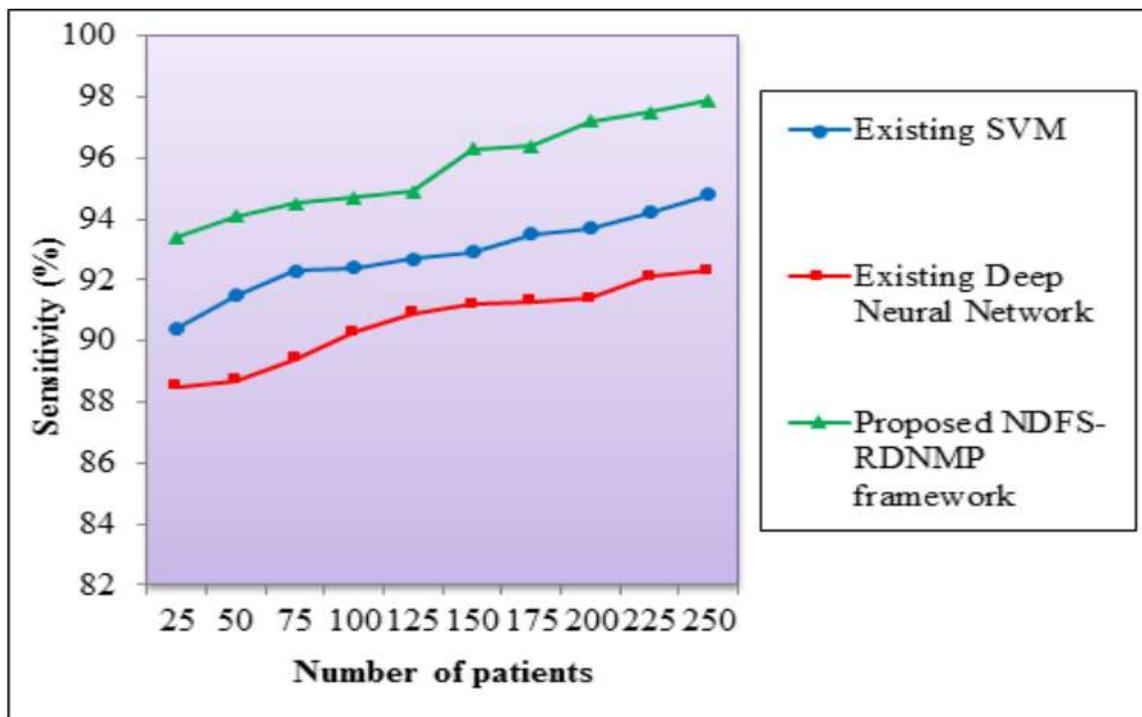

Figure 4: Sensitivity comparisons with proposed framework

Importantly, the research also took into account factors likely to have a negative impact on patients' attitude towards telehealth interventions like the absence of bodily contact, low accessibility to telehealth equipment, and excessive dependency on experts via telehealth services.

CONCLUSION

The research concludes that patient education combined with appropriately designed mobile applications has a stronger influence on patients' knowledge, attitude, and practice regarding their disease management. The maternal GDM hypothyroidism information app resulted in a positive influence among GDM/maternal hypothyroidism patients. Patient education must be a continuous process, and patients must be evaluated at each follow-up visit for adherence to medication to attain improved health outcomes. By giving accurate information, lowering stigmas, and enhancing procedures, mobile app-based holistic education closes gaps in inpatient care for expectant mothers with chronic conditions such maternal hypothyroidism and GDM. Pharmacists may provide individualized counselling with this cutting-edge tool, improving patient care and results.

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