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Evaluation of a Structured Educational Program on Awareness and Prevention of Diabetic Foot Ulcers Among Diabetic Patients at a Government Medical College and Hospital in Mundiyampakkam, Villupuram District

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Abstract

Diabetic foot ulcers (DFUs) emerge as complications of diabetes mellitus alongside several other challenges whereas these foot issues produce substantial health problems and reduce both life duration and quality of life measures. The occurrence of DFUs results in a major reason for lower limb amputations alongside the potential risk of developing serious infections unless proper management occurs. Medical treatment availability has not solved the problem of DFUs since diabetic patients lack awareness and practice poor foot care which continues as major causes for DFU development. STPs have established their efficiency at bettering patient knowledge while fostering individual diabetic self-care and preventing disease complications.A research examines how a prepared structured teaching program affects diabetic foot ulcer prevention knowledge acquisition of patients at Government Medical College and Hospital in Mundiyampakkam Villupuram District. The research design involves a quasi-experimental approach that measures knowledge changes from pre-test to post-test assessment. A research instrument will provide diabetic patients with a questionnaire to determine their initial knowledge about foot care measures combined with risk indicators and DFU early detection protocols and prevention strategies. Educational content will be delivered through interactive lectures with demonstrations supported by audiovisual materials to patients. Test results after intervention delivery will evaluate participant understanding improvement about the subject matter.The research results from this study will deliver significant knowledge about structured teaching programs for preventing diabetic foot ulcer occurrences. Such interventions that enhance patient education and self-care practice simultaneously function as essential tools to decrease foot problems and minimize potential amputation risks. This research demonstrates the significance of educating diabetes patients and will function as an example for future educational programs focused on enhancing patient learning within similar health facilities.

Keywords: ***Diabetic foot ulcer (DFU), Diabetes mellitus, Foot care awareness, Structured teaching program (STP), Patient education, Prevention strategies, Self-care behavior, Quasi-experimental study, Knowledge assessment, Government hospital intervention***

1.Introduction

Diabetes mellitus stands as a major persistent illness which affects a large number of individuals worldwide. The condition of diabetes manifests through elevated blood glucose levels because of insulin resistance together with inadequate insulin production which causes severe complications across heart and kidney, eye and nerve systems. The most devastating diabetic foot ulcer complication occurs as DFU because it leads to dangerous infections together with gangrene up to complete amputation being required in severe cases. High blood sugar levels worsen peripheral neuropathy and poor blood circulation and impaired wound healing so diabetic foot ulcers form through their combination with these factors. Diabetic foot ulcers carry an extensive impact because they cause patient disability through reduced life quality and create substantial healthcare expenses and require considerable healthcare resources. Medical progress and modern wound care techniques fail to lower the DFU prevalence because developing nations lack sufficient programs for prevention and disease awareness(1). The reduction of DFU frequency together with decreased severity can be achieved best by educational programs which teach patients essential information about prevention strategies and treatment methods. Scientific research has found that diabetes education demonstrates strong significance in complication reduction because patients who have better knowledge tend to perform correct foot care practices and detect early warning signs faster which leads them to seek medical attention on time. Most diabetic patients who come from lower socioeconomic groups tend to face inadequate awareness about DFU prevention which delays both their diagnoses and necessary medical care.

The evaluation of a designed and structured teaching program (STP) for DFU prevention education in diabetic patients constitutes the primary importance of this investigation. The study implements an educational framework with targeted lessons to assess how well structured patient teaching affects diabetic patient understanding and promotes self-care practices. The research addresses a crucial need to develop effective self-care measures and early diagnosis solutions for diabetes-related amputations by offering a cost-efficient and minimally invasive prevention approach for diabetic foot ulcers.

The research introduced an organized teaching protocol that provided diabetic patients instructions regarding DFU preventive measures that combined foot cleaning along with suitable footwear choice with frequent self-examinations and blood sugar level control. Proof-based guidelines serve as a foundation to develop this intervention which places patient education at its core for diabetes management. This research seeks to assess the impact of the educational program through measuring patient knowledge enhancement before and after the intervention to understand structured learning effectiveness in DFU awareness promotion(2).

India faces a growing diabetic epidemic which demands immediate appropriate preventive actions. The development of foot ulcers affects 25% of individuals with diabetes during their lifetime yet many such ulcers result in both infection and subsequent amputation cases. The significant social and mental burden of DFU demands that diabetes management strategies should now include patient education for prevention purposes. This study adds to current literature through its investigation of structured teaching programs as they affect DFU-related knowledge and decrease corresponding complications.

The research analyzes a hospital-based STP as a basis to develop beneficial knowledge usable in larger-scale diabetes educational initiatives. The research findings form a base for further studies and policy development which motivates healthcare institutions to implement structured diabetes education into their normal clinical procedures. Raising healthcare provider and patient awareness together with preventive measures will lower DFU occurrences which leads to better diabetes patient well-being while reducing medical system expenses.

Background Of the Study

The presence of diabetes mellitus represents a world-wide healthcare emergency because physicians encounter new patient cases at steady annual rates. The World Health Organization (WHO) expects diabetes prevalence to reach 422 million people worldwide during the next decades because individuals are becoming more obese while spending less time being physically active and eating less healthily. DFU ranks as one of the worst complications which develop from diabetes. A significant number of diabetic patients experience DFUs which causes severe mortality chances and sustained disability and necessitates full amputations of their lower limbs. Peripheral neuropathy working in combination with peripheral artery disease (PAD) and continuous high blood sugar levels triggers multiple healing complications in patients with diabetes.

Fiability of foot ulcers in diabetes patients arises from their recurrent infections which pose a danger for patients by causing severe tissue damage leading to gangrene until they reach the point of potential amputation. According to the International Diabetes Federation (IDF) studies demonstrate that 15–25% of diabetic patients will develop foot ulcers eventually and 85% of diabetes-related amputations start after patients experience previous foot ulcer development. The available medical options do not address the deadly consequence of diabetes-related foot amputations caused by diabetic foot ulcers(3). The five-year death rate for patients who experience diabetes-related foot amputations is equivalent to the cancer mortality rate according to documented research findings. There is an urgent medical need to establish both preventive tactics and DFU treatment strategies prior to severe DFU complications.

The rapidly growing number of diabetic cases throughout Indian developing areas worsens the problem of diabetic foot ulcers. The official designation of "Diabetes Capital" applies to India due to its 77 million diabetic population that is expected for 2023. Three primary obstacles limit diabetic patients' interest in foot care education for ulcer prevention: health care accessibility issues together with monetary barriers and insufficient population awareness. Primary identification of DFU indicators shows limitations since patients fail to notice subtle symptoms causing delays in their medical care access. Medical professionals must conduct aggressive procedures such as ulcer debridement before hospital admission because neglected diabetic foot ulcers develop severe infections that lead to amputations.

Research on diabetic foot ulcer risks demonstrates the need for extensive preventive education in diabetes care strategies although this strategy is not used appropriately enough. Studies reveal that diabetic patients lack necessary knowledge about both foot hygiene practices as well as recognition of early foot ulcers and appropriate footwear criteria. Insufficient learning by patients concerning DFU matters significantly contributes to the development of DFU complications. Structured teaching programs (STPs) provide effective programs which teach patients valuable abilities to prevent foot ulcer development successfully. Patients with diabetes learn correct foot care strategies and self-assessment methods as well as methods to control their blood sugar and prevent hazardous injuries to their feet. Research data indicates that multistep diabetes educational approaches succeeded by resulting in a 50% decrease of diabetic foot ulcers.

The effective results of structured teaching programs in diabetes care led the American Diabetes Association (ADA) together with International Working Group on the Diabetic Foot (IWGDF) and WHO to endorse this approach. Medical organizations have declared patient education as vital for minimize medical complications and achieve comprehensive disease control. Through interactive learning methods with visual components coupled with practical demonstrations structured teaching programs foster better understanding of foot care among patients so they maintain their self-care practices. The combination of follow-up sessions supported by continuous reinforcement enables patients to keep their learned knowledge until their modified behaviors become persistent activities that minimize DFU complications.

A targeted teaching strategy intended for DFU preventive information seeks to measure its influence on diabetic patients receiving care at Government Medical College Hospital at Mundiyampakkam, Villupuram District. The study assesses patient comprehension during two key points to determine if organized teaching helps patients recognize information and stimulate their commitment to foot care. Research outcomes enable health authorities to establish new policies that will motivate hospitals to adopt structure teaching approaches in their diabetes management programs.

Medical treatments fail to ensure diabetic foot ulcer prevention since patients require active involvement and education programs to safeguard their feet from damage. The structured teaching program serves as a cost-effective strategy that extends across various settings to remedy inadequate knowledge which results in diminished diabetic foot ulcer results. The delivery of essential skills information and knowledge by healthcare providers helps diabetic patients develop greater self-awareness to enhance their health status and achieve better clinical results which decreases diabetes-complicated amputations while improving their life quality(4).

2. Objectives of the Study

This research determines how effective a structured teaching program (STP) functions for diabetic foot ulcer (DFU) prevention knowledge acquisition among patients at the Government Medical College and Hospital in Mundiyampakkam, Villupuram District. Researchers evaluate the ability of systematic education to enhance diabetic patient awareness levels and their foot care actions and preventive measures for early ulcer detection in this research study.

Specific Objectives:

- The survey examined diabetic patients' awareness about the prevention of diabetic foot ulcers before starting the formal teaching program.
- The program would provide structured instruction about diabetic foot ulcer origins as well as risk elements together with methods to prevent these ulcers and identify them early.
- The knowledge acquisition of diabetic patients will be evaluated after they participate in the structured teaching program.
- The structured teaching program's effectiveness will be measured through comparison of knowledge test scores obtained from diabetic patients both before and after completing the educational sessions.
- The pre-test knowledge scores of diabetic patients will be examined based on their age, gender, education and socioeconomic status, duration of diabetes and history of foot complications.
- The research delivers recommended educational strategies that healthcare environments should implement to stop diabetic foot ulcers.
- The research evaluates how structured education affects diabetic patient awareness alongside foot care activities which leads to decreased DFU occurrence together with related medical complications.

Hypothesis

Null Hypothesis (NH)

The level of diabetic foot ulcer prevention knowledge among diabetic patients does not differ substantially following a structured teaching program according to $p < 0.05$ level.

The pre-test knowledge factors of diabetic patients show no linkage with their chosen demographic elements as determined by $p < 0.05$.

Alternative Hypothesis (AH)

The structured teaching program's effectiveness becomes evident through its ability to produce substantial knowledge increases regarding diabetic foot ulcer prevention at $p < 0.05$ level.

Prior knowledge levels of diabetic patients exhibit a relevant connection to their demographic factors according to the $p < 0.05$ criterion.

Statistical evaluation of the structured teaching program will reveal its effects through hypothesis tests while highlighting the demographic attributes that impact DFU awareness.

Significance of the Study

The study results will deliver important effects in diabetes educational delivery methods and medical care system administration. A successful implementation of this structured teaching program should make it ready for widespread adoption in hospitals and clinics and community health centers to decrease diabetic foot ulcer occurrences(5).

1. Contribution to Clinical Practice

Healthcare providers will benefit from using this structured foot care educational approach in their diabetes care protocols.

The approach increases early detection procedures which supports preventive strategies meant to reduce DFU likelihood.

2. Contribution to Patient Awareness

The improved education results in better patient self-care actions which decreases their susceptibility to complications.

Diabetic patients learn to identify the earliest signs of foot ulcers easily because it allows them to obtain timely care for better results.

3. Contribution to Healthcare Policy

Using data analysis the system recommends necessary steps for organizing diabetes education initiatives nationally.

The study prompts government officials to directly fund programs focused on educating diabetic patients because this will decrease their rates of amputation.

4. Economic Impact

By stopping DFU from developing healthcare institutions could save major expenses dedicated to hospital stays and surgical procedures plus prolonged therapeutic treatments.

The intervention enhances diabetic patients' working performance which decreases the financial costs they face both individually and within healthcare institutions.

3.Research Methodology

Any scientific study requires research methodology as its fundamental component because it defines the structured approach for investigating research problems. The study methodology ensures scientists conduct their work up to accepted ethical standards and produce valid results that researchers can effectively understand. Herewith the research investigates how a structured teaching program (STP) assists diabetic patients at the Government Medical College and Hospital in Mundiyampakkam, Villupuram District to acquire better knowledge regarding diabetic foot ulcers (DFU) prevention. The growing incidence of diabetic foot complications combined with the major health risks associated with foot ulcers requires finding successful educational methods that boost patients' preventive understanding. This section explains all research elements from approach to ethical considerations which were utilized in this study. A well-planned methodology was developed to demonstrate how the DFU prevention outcomes of structured education should guide nursing care interventions and diabetes management protocols in the future.

Research approach

Quantitative research offered the most suitable approach since it enables researchers to measure variables systematically while using statistical procedures to assess intervention success. Research through the quantitative approach specifically works well for knowledge assessment by allowing investigators to compare pre-test and post-

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test scoring data points. Structure within this approach leads to both objective measurements and precise results that can be duplicated to give reliable assessments of clinical educational interventions. A quantitative research design will enable researchers to produce definitive statistical evidence about the success of structured teaching programs in boosting patient diabetic foot care and ulcer prevention knowledge(6).

Research design

The researchers selected a quasi-experimental one-group pre-test and post-test research design as the methodology for their study. The research team selected this design because it enables them to evaluate knowledge changes from before to after the program while proving that the structured teaching program created these effects. Testing participants before education establishes their current understanding of DFU prevention knowledge which then gets reassessed after receiving the study intervention. The research centered on healthcare practice implementation which provided the structured teaching program to all participants as standard educational material. The established research design finds widespread application in educational and intervention studies for measuring structured learning outcomes on health-related knowledge.

Setting Of the Study

The research took place within the Government Medical College and Hospital at Mundiyampakkam in Villupuram District Tamil Nadu. The health center was chosen because it deals with extensive diabetes patient care which offers an optimal environment to test the effectiveness of the educational intervention. A wide range of patients with various socioeconomic backgrounds receives care in the hospital which enables the study results to apply across diverse communities. Healthcare professionals and structured outpatient services together with educational facilities enabled the effective delivery of the structured teaching program. The ability to implement learning immediately arose from studying within a clinical environment because patients received prompt guidance from medical professionals about DFU prevention.

Population and Sampling Technique

People with diabetes attending Government Medical College and Hospital formed the composition of the study group. People participating in the study exhibited different risk levels for DFU which qualified them as suitable subjects for receiving an education about foot ulcer prevention. During the investigation period the study recruited patients whose admission fit study requirements and were willing to collaborate. Thirty diabetic patients were selected from the Government Medical College and Hospital using convenience sampling techniques. The researcher selected this sampling method to recruit participants efficiently because it enabled fast participant access who showed readiness to take part in the study. The study used pragmatic participant choice methods due to time limitations and budget restrictions combined with the availability of patients.

4. Data Analysis and Interpretation

Any research study requires data analysis since this process lets researchers transform unrevealed data into useful insights which help explain the research problem. The research assesses how well structured teaching program (STP) enhances patient knowledge about diabetic foot ulcer prevention at the Government Medical College and Hospital in Mundiyampakkam Villupuram District. Systematic examination of data obtained from pre-test and post-test measurements allowed researchers to analyze knowledge changes and assess the impact of the educational program. The researchers subjected the results to statistical analysis to validate their findings about the structured teaching program.

Descriptive Analysis Of Demographic Variables

The analysis started with summarizing participant demographic information. Research included evaluation of age, gender, educational status, marital status, occupation, monthly income, type of family, dietary habits and duration of diabetes. All these identified factors enable researchers to interpret results by providing context and permitting assessments about how individual variables affect DFU prevention awareness.

The research included thirty diabetic patients older than fifty years because this population faces increased susceptibility to diabetic foot ulcers(7). The survey demonstrated that males represented 60 percent while females made up 40 percent of the total participants which suggests diabetes impacts men and women equally but men exhibited slightly higher numbers than women. The participant group consisted of 80% who only graduated from primary school and 6.7% who completed secondary education and 6.7% who obtained a college-level degree. The low level of formal education may play a direct role in why people lack knowledge about DFU prevention and therefore supports the need for organized health education initiatives.

All participants identified as married which implies beneficial support from their spouses when it comes to diabetes management and preventive foot care practices. Inadequate footwear access and medical check-ups together with insufficient diabetes management resources exist among 86.7% of the participants who work as daily wage earners. Data revealed that 70% of surveyed participants had monthly earnings below ₹5000 whereas 6.7% reported incomes above ₹15,000 each month. The existing economic differences demonstrate how financial limitations stop diabetes patients from placing sufficient emphasis on their feet.

Research examined dietary habits because they proved crucial to the study findings. Among the surveyed group 90% followed a mixed food consumption pattern and vegetarians made up only 3.3% of the total participants. Results show that individuals who eat carbohydrates tend to demonstrate weak glucose management which leads to Developmental Foot Ulcers (DFU). Data revealed that smoking combined with alcohol consumption existed as bad habits among 36.7 percent of participants whose histories include these well-documented risk factors for peripheral neuropathy and vascular conditions that result in foot ulcers. Among the participants the diabetes duration fell into three categories: 33.3% maintained diabetes for more than 10 years while 30% had it for 3 to 6 years and 26.7% had diabetes between 1 to 3 years. The results demonstrate that prolonged diabetes duration heightens patients' susceptibility to developing foot ulcers because patients must participate in ongoing preventive education programs.

The outlined demographic analysis reveals key information about economic conditions together with daily activities which affect diabetes-associated health issues. Additional patient education is essential because it helps diabetic patients fill knowledge gaps while teaching them proper foot care methods.

The researchers compared the patient knowledge levels through pre-intervention tests and post-intervention tests.

The central goal of this research analyzed the effectiveness of structured teaching program (STP) in enhancing DFU prevention knowledge levels. The structured teaching program's effectiveness was determined by comparing participant knowledge scores obtained before the intervention through the pre-test and afterward during the post-test. Eighty percent of the participants demonstrated insufficient DFU prevention knowledge before the intervention and 20 percent displayed moderate knowledge but no participants showed adequate knowledge levels. The amount of diabetic patient knowledge deficit emerged as a notable problem in the patient base before the educational program started. The participants displayed insufficient understanding about foot hygiene as well as early warning signs of DFU and appropriate footwear choices and the significance of glycemic control for preventing foot ulcers.

The patients demonstrated substantial knowledge growth after receiving the structured teaching program. After the program evaluation showed that 93.3% of participants demonstrated adequate knowledge but 6.7% had moderate knowledge with no respondents in the inadequate category. The structured teaching program delivered outstanding results by increasing knowledge scores about DFU prevention to a significant extent. Post-test results indicate that combining educational sessions with visual materials alongside live demonstrations along with interactive discussions creates a major impact on patients' ability to understand and remember the information.

The statistical evaluation of these findings occurred through performing a paired t-test which analyzed pre-test and post-test scores. Type I error rates proved statistically significant at $p < 0.05$ because the obtained t-value equaled 0.09. Statistical testing shows that the educated knowledge level observed after the structured teaching program resulted from the program itself instead of random factors. The study results demonstrate that structured diabetes education needs to become standardized treatment protocols for DFU risk reduction purposes.

The examination between pre-intervention knowledge scores and demographic factors generated statistical findings Different demographic features affected baseline DFU prevention knowledge according to the results of a chi-square statistical test that compared pre-test scores to variables such as diabetes duration and education level and occupational status.

The analysis showed that:

The analysis established education level as a significant predictor of pre-test knowledge scores since p value reached 0.05. Participant baseline knowledge about DFU prevention was higher among the more educated group who demonstrated better understanding but the less educated group had less overall awareness about DFU prevention.

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The duration of diabetes proved significant to pre-test scores of knowledge ($p < 0.05$). Long-term duration of diabetes exposure served as a likely cause for patients to become knowledgeable about DFU risks because they received healthcare services and medical consultations.

The research revealed no significant connection between knowledge levels and participants' age combined with occupational background since the p value exceeded 0.05. Educational programs targeting all diabetic patients become essential because awareness about DFU prevention exists in every age group and occupational sector.

The research indicates that instructional programs about DFU prevention need to focus on people with limited education backgrounds and patients who recently received diabetes diagnosis because these groups show the most severe deficits in understanding prevention measures.

5.Conclusion and Future work

Diabetic foot ulcers (DFUs) function as a major diabetes mellitus complication which enhances patient mortality while causing hospitalization time extension and triggering lower limb amputations. Advanced medical treatments exist but substandard patient awareness and insufficient preventive knowledge about diabetic foot ulcers stands as the primary obstacle to decrease DFU-related complications rates. A structured teaching program (STP) received evaluation for DFU prevention knowledge growth in diabetic patients treated at the Government Medical College and Hospital in Mundiyampakkam, Villupuram District. Scientific evidence from this research reinforces that formal instruction methods improve patient understanding about self-care skills while decreasing foot ulcer risks.

Most participants showed insufficient knowledge about DFU prevention according to pre-test assessments because they failed to recognize proper foot hygiene practices and early ulcer identification together with glycemic control significance. Structural teaching led to notable changes in post-test scores because most participants developed sufficient knowledge levels. The structured teaching program proved very effective in diabetic patient DFU prevention education because results from paired t-tests demonstrated significant pre-test to post-test knowledge level variation. The analyses connecting baseline knowledge scores to demographic factors showed education levels and diabetes duration as crucial predictors of pre-test understanding so direct instructional approaches must consider these characteristics when educating new diabetes patients with lower education levels.

These findings demonstrate an absolute necessity to establish structure education programs in standard diabetes management practices. Diabetes educators together with nurses should continue guiding healthcare patients through ongoing foot care instruction which includes DFU warning signs and risk identification and proper practices. Through regular awareness sessions, interactive workshops and patient-specific educational materials healthcare institutions will enable diabetic patients to use proactive prevention methods against foot ulcers. Community health initiatives should include structured education programs to provide necessary preventive knowledge to diabetic patients from low-income areas and rural communities.

Future Work

The research demonstrated that structured teaching programs produce effective DFU-related knowledge improvements but additional investigation is needed in various directions. Future research can focus on:

Future studies need to assess both the long-term maintenance of education-centered knowledge and its effects on patient preventive behavior and decelerated DFU occurrence over several years. Research involving continuous observation will determine if additional educational interventions boost patient compliance with preventive practices.

Future research needs to examine how mobile technology along with virtual learning systems and telemedicine programs enhance diabetic foot prevention education. Active mobile applications with self-testing modules should join standard teaching strategies to improve the accessibility of educational content for foot care.

The essential step forward consists of extending organized diabetes education programs to every rural community where access to teaching remains limited. Research should evaluate how peer education shows results when diabetic patients receive training to instruct other community members about disease management and preventative care approaches.

The prevention of DFU needs multidisciplinary teams consisting of endocrinologists together with podiatrists, nurses, dietitians, and physiotherapists in future preventive strategies. Geared research initiatives should evaluate the performance of coordinated treatment plans to lower complications linked to foot ulcers in diabetic patients.

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Conflicts of interest

The authors have no conflicts of interest to declare

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