

Effect of Nursing Intervention Package On Pre-Diabetic Status among Adults: A Systematic Review

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ABSTRACT:

Background: India is known as the diabetes capital of the world, with 64.5 million people living with diabetes. By 2030, this number is expected to rise to 87 million. This increase is largely due to lifestyle changes, including unhealthy eating habits and reduced physical activity. According to the International Diabetes Federation (IDF), more than half (66%) of Indians are unaware of their diabetic status, compared to 50% in Europe and 33% in the USA. Approximately 4.4 million Indians are unaware they have diabetes, putting them at higher risk of developing complications. A study by Ramachandran et al. revealed that for every known case of diabetes in India, there are 1.2 undiagnosed cases. Another study by Khan et al. highlighted that early screening for diabetes can significantly improve the quality of life and increase life expectancy for individuals over time.

Methods and Materials: To gather information, 130 research articles were reviewed from databases like PubMed, Google Scholar, Cochrane Library, Academia, Open Access, and the Directory of Open Access Journals. The keywords “Prediabetes” and “Intervention Package” were used to search for relevant studies. After applying inclusion and exclusion criteria, 15 studies were selected for detailed analysis. The systematic review was conducted following the PRISMA guidelines, which are standard procedures for reviewing and reporting studies.

Results: The majority of the studies used a quasi-experimental design with pretest-posttest control groups. Sample sizes varied from 30 to 400 participants, with one study involving 549 participants. Most studies collected data using the Indian Diabetes Risk Score (IDRS), HbA1c levels, and fasting blood sugar (FBS) tests. All the studies concluded that intervention packages were effective in managing prediabetes and preventing its progression to diabetes.

Conclusion:

India is facing a serious diabetes problem, with many people unaware of their condition, increasing their risk of complications. This review shows that early screening and intervention can help prevent prediabetes from turning into diabetes. Studies using tools like IDRS, HbA1c, and FBS confirmed that intervention programs are effective in managing prediabetes. These findings highlight the need for lifestyle changes and awareness programs to address this growing issue. By adopting such strategies on a larger scale, we can improve the quality of life for people at risk and reduce the impact of diabetes in India.

Introduction

Nursing interventions have proven to be effective in managing various chronic conditions, including diabetes. However, there is limited research on the effectiveness of nursing intervention packages specifically tailored to young adults with prediabetes. A comprehensive nursing intervention package, including personalized dietary guidance, exercise recommendations, health education, behaviour modification support, and regular monitoring, could significantly benefit individuals in managing prediabetes. This study aims to evaluate the impact of such an intervention on blood sugar control, lifestyle changes, and overall health outcomes in young adults with prediabetes.¹ The findings of this study could have important public health implications. By identifying prediabetes early and implementing a targeted nursing intervention package, it is possible to prevent or delay the onset of type 2 diabetes, reducing the burden on healthcare systems. Empowering young adults with knowledge about their health and providing tools for positive lifestyle changes can lead to better long-term health outcomes and an improved quality of life.

This study also aims to establish evidence-based guidelines for managing prediabetes among young adults. These guidelines can be adopted by healthcare institutions and nursing professionals to develop effective intervention programs. Furthermore, the outcomes of this study will contribute to existing research on prediabetes management and inform future research and policy development in preventive healthcare.²

In India, the overall prevalence of prediabetes across 15 states is 10.3%, but in Maharashtra, it is slightly higher at 12.8%.³ This reflects a growing concern, particularly among young adults. Prediabetes is characterized by higher-than-normal blood sugar levels that have not yet reached the threshold for a type 2 diabetes diagnosis.⁴ Therising prevalence is attributed to sedentary lifestyles, unhealthy eating habits, and increasing obesity rates. Identifying prediabetes early in young adults is critical to preventing its progression to diabetes and related complications.

This study aims to contribute to better healthcare practices for young adults and address the broader public health challenge of diabetes prevention.

The objectives of the current systematic review were

1. To understand the procedure of identifying prediabetes.
2. To understand the research methodology used in the various studies.
3. To find out the impact of nursing intervention on prediabetes status.
4. To understand the data analysis methods used in the studies.

Methods and Materials

Literature Search: A systematic literature search was conducted from June 2019 to December 2023. The investigator searched the studies related to the effectiveness of the Nursing Intervention package on prediabetes. The outcome of the literature search was analyzed and confirmed in September 2024. Published thesis and articles from various journals were included in the review up to December 2023. The literature search was done by using national and international databases such as PubMed, Google Scholar, CochraneLibrary, Academia, Open Access, Science Direct and Directory of Open. The keywords used to search the literature were “intervention package”, and “prediabetes”. Google search engine was also used to explore the open-access publications. Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) guidelines were followed by the researcher to conduct the review.

Inclusion Criteria

- Articles published in peer-reviewed journals.
- Articles written in English language.
- Open access thesis available on databases.
- Articles & thesis published from June 2019 to December 2023.
- Quantitative studies.
- Experimental studies.

Exclusion Criteria

- Review articles

The primary literature search resulted in 150 documents. Duplicate and irrelevant articles were removed. 38 articles were selected for careful and complete reading. A total of 15 full-text articles were selected for review.

Systematic Review of Effect of Intervention Package on Pre-Diabetic Status (2019 to 2023)

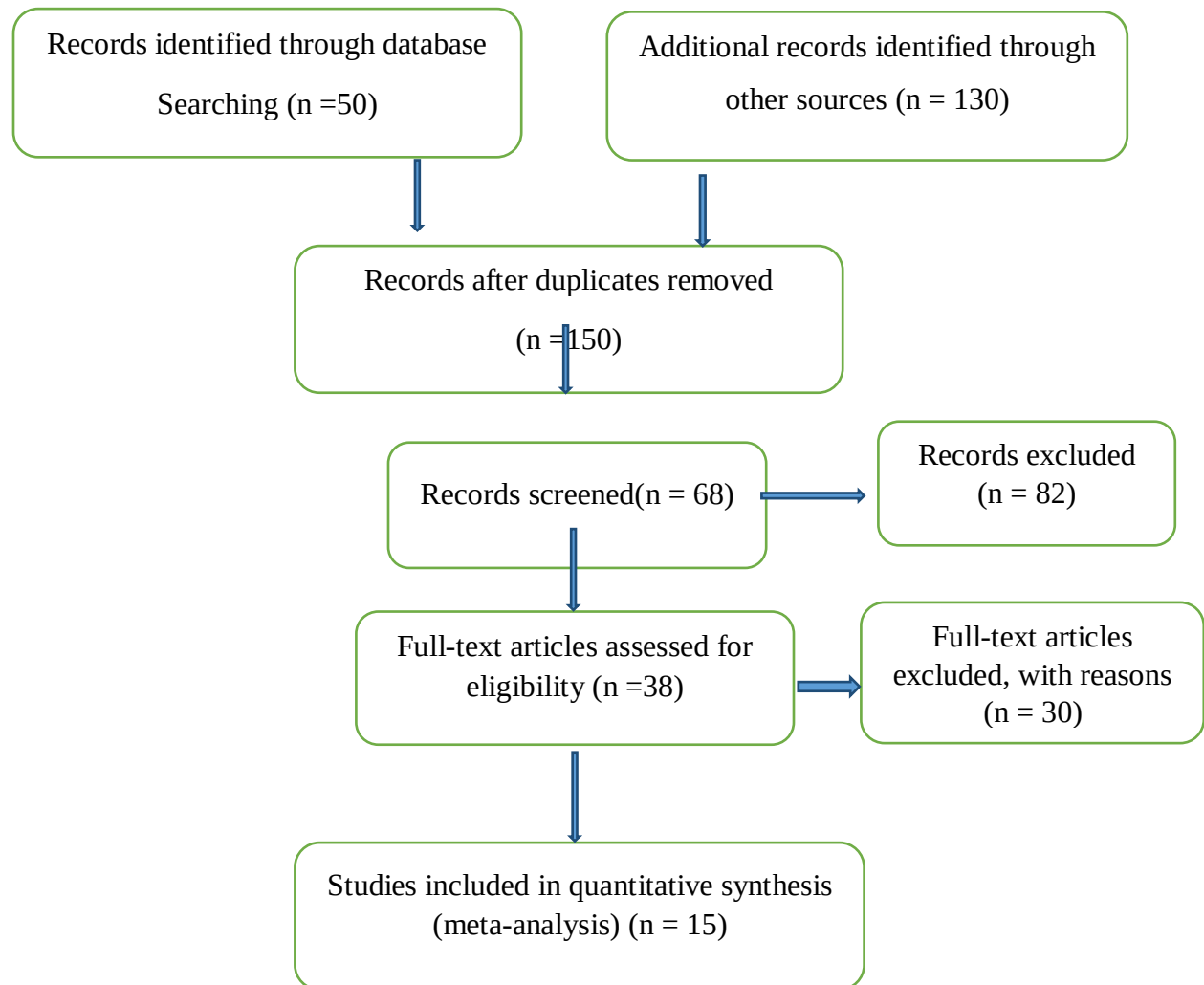


Table-1- Systematic Review Flow Diagram.

Table- 1 Characteristics of Systematic Review Studies (2019-2023)											
S r. N o	Publi shed Year	Journa l Name	First Author	Ag e ra nge	Sample size/ Research Design/ Sampling technique	Setting	Relia bility & Valid ity	Data Collectio n tool	Interv ention	Result	Qu alit y of arti cle
1	2021	Clinical Nutrition	D.A. Díaz-Rizzolo	65 and above	152, randomised control trial, simple random sampling	Three primary care centres in Barcelona	NA	Nutrition education based on clinical guidelines issued by the American Diabetes Association	4 month	We conclude that a year T2D-prevention diet with sardine supplementation has a greater protective effect against developing T2D and CV events	Good
2	2023	BMJ Nutrition, Prevention & Health	Pushpanjali Shakya, Archana Shrestha	18 – 64 years	448, a community-based open-label two-armed cluster randomized controlled trial	Two urban settings, Patan and Dhulikhel of Nepal.	NA	IDRS SCALE, HBA1c, Random Blood Sugar	6 month	study was able to demonstrate some positive effects of the intervention to prevent diabetes among individuals with pre-diabetes	Good
3	2019	BMJ Open	Kirsten Coppell	18 – 69 years	400, A mixed-methods study follows a pragmatic nonrandomised	Hawke's Bay, New Zealand	NA	HbA1c, BMI,	6 month	The most obvious outcome would include a more responsive health	Good

					study					system with early detection, destigmatisation, early 'no blame' intervention and prevention programs for families who are at risk of developing T2DM	
4	2024	Journal of Education and Health Promotion	Bhumika Koirala, Venkatesan Balu	30 - 60 years	60, A quasi-experimental alone-group pretest-posttest design, a simple random sampling technique by the lottery method	urban community, Bangalore,	NA	tool consists of three parts: Section A consists of demographic information such as age; gender;	2 month	The study concluded that CNIP had a great role in increasing the level of knowledge and practice among adults in the prevention of NIDDM	Good
5	2019	RUTGERS UNIVERSITY LIBRARIES	Mary Diaz-Garcia	18 - 89 years	30, pre-/post intervention design	a primary care practice in Hudson County in northern New Jersey.	NA	HgbA1c and BMI	3 month	: This culturally tailored diabetes prevention program for the high-risk Hispanic/Latino population, demonstrated preliminary effectiveness in the reduction of HgbA1c	Good

										and/or BMI	
6	2021	The Journal of Health Care Organiz ation, Provisi on, and Financi ng	Maud Joachim- Celestin	30 - 60 ye ars	mixed- method studywas conducted among low- income H/L residing in the Inland Empire Region of Southern California	Souther n Califor nia	NA	weight, glycosylat ed haemoglo bin	3 month	Our findings indicate that a joint prevention/ self- manageme nt interventio n led by CHWs for low- income Hispanic/ Latinos with diabetes and pre- diabetes is feasible and cost- effective, providing results that could help reduce the success gap.	Good
7	2022	Journal of Glob Health	Ainul NM Hanafiah	20 - 39 ye ars	549, a non- blinded, randomiz ed controlled trial (RCT)	district of Seremb an, in the state of Negeri Sembil an, Malays ia	NA	(Food Frequenc y Questionn aire, FFQ), physical activity (Internati onal Physical Activity Questionn aire, IPAQ) and mental health (Depressi	33wee k	The Jom Mama pre- conception interventio n did not lead to a reduction in waist circumfere nce or significant changes in other secondary outcomes over the eight months prior to	Good

								on Anxiety Stress Scale, DASS 21)		conception.	
8	2021	Food and Nutritio n Bulletin	Harleen Kaur	30 - 50 ye ars	120, quasi experime ntal one group pretestpos ttest control design	Ludhia na, Punjab	NA	IDRS SCALE, FBG	3 month	Nutrition counselling of the prediabetic s regarding dietary and lifestyle modificatio n is recommen ded to improve their metabolic control, thus preventing them from being diabetics.	Good
9	2020	Egyptia n Journal of Health Care	Mona Mohamed Ibrahim	40 - 60 ye ars	A quasi- experime ntal research, a convenie nce sample of 160	Manso ura Univers ity in Egypt.	The validi ty of tools was done by 7 exper ts from the medi cal and nursi ng fields , the reliab ility coeffi cient was	A Structure d interview questionn aire, Anthropo metric and serologica l evaluatio n	3 month	Applying the nurse- led lifestyle program has a positive effect on promoting self- efficacy and health- promoting behaviours for metabolic syndrome patients.	Good

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10	2022	Nutrients	Isabel María Blancas-Sánchez	NA	254, a pre- and post-nutritional, randomized, single-blind intervention on parallel groups of a schoolchild, non-probabilistic convenience sampling	rural areas of Spain	NA	nutritional intervention was analyzed through astrophotometric and glycemic measurements and validated surveys	2 months	The results showed that both groups' anthropometric parameters improved, a more significant decrease was observed in the experimental group compared to the control.	Good
11	2021	Public Health Nutrition	Sally L Abel	28 – 69 years	58, A qualitative study involving semi-structured, face-to-face interviews with a stratified sample of adults	Hawke's Bay, Aotearoa/New Zealand	NA	(glycated (HbA1c) 41–49 mmol/mol)(31), and a BMI	6 months	Influences on dietary change involved personal, interpersonal, organisational, environmental and policy factor	Good
12	2022	BMC	Kolsoum Mohammad Molaugh	30 - 50 years	71, a cluster-randomized controlled trial with a pretest, post-test design (single-blind)	Arak, Iran, in 2020	NA	a questionnaire based on the theory of planned behaviour (TPB)	3 months	Education based on the theory of planned behaviour, by holding face-to-face meetings along with following up the samples	Good

										after the educational intervention, can promote a healthy lifestyle in pre-diabetic women	
13	2022	Tanta Scientific Nursing Journal	Hassnaa Eid Shaban Mosa	19 - 58 years	A quasi-experimental with pre, and post-testPurposive sample of 250 pre-diabetics	Menoufia University and Shebin El-kom	NA	Four tools were utilized. I. Self-administered questionnaire II: Protection Motivation Theory questionnaire; III: Nutritional assessment sheet. IV: Diabetes mellitus modifiable risk assessment score	NA	The protection motivation sustained by integrated nursing intervention has been beneficial in decreasing the total risk score of Diabetes mellitus among pre-diabetics, improving disease-related healthy behaviours such as consuming a healthy diet, being physically active, reducing their weight, cholesterol & cumulative glucose level and number of smoked	Good

										cigarettes	
14	2020	Nutrients	Miquel Bennasar-Veny	20 to 65 years	adult workers, A cohort study	Spain	NA	FPG, At the baseline evaluation, sociodemographic, anthropometric, metabolic, and lifestyle data were collected.	NA	Physical activity, diet, smoking, and BMI are modifiable factors that are associated with the persistence of prediabetes and the progression to T2D	Good
15	2021	Journal of Natural Science, Biology and Medicine	K. Mohsina Hyder	25 - 55 years	313, community-based prospective open-label interventional study	in 4 districts of Kerala and Tamil Nadu in South India	NA	HbA1c, FBS	3 months	Results from our study show that muscle-specific indoor exercises can also be an effective strategy in the early management of prediabetes.	Good

Results and Discussion

General Characteristics: The first objective of the study is to understand the procedure for identifying prediabetes. Most of the studies used the IDRS scale and HbA1c and FBS to identify the prediabetes subjects. The second objective of the study was to understand the research methodology used in the various studies. The research methodology used by various investigators in this systematic review is presented in Table 1. There were 2 studies published in 2019, 2 studies in 2020, 5 studies in 2021, 4 studies in 2022 and 1 in 2023, 1 in 2024. Out of 15 studies included in the review, 7 studies are from a published thesis available on the databases. Maximum studies were published and conducted in India. Sample sizes in the studies were between 30 & 400. A sample size of 60 was very common in most of the studies. The age group in all the studies ranged between 18 to 50 years. All studies used a quasi-experimental design.

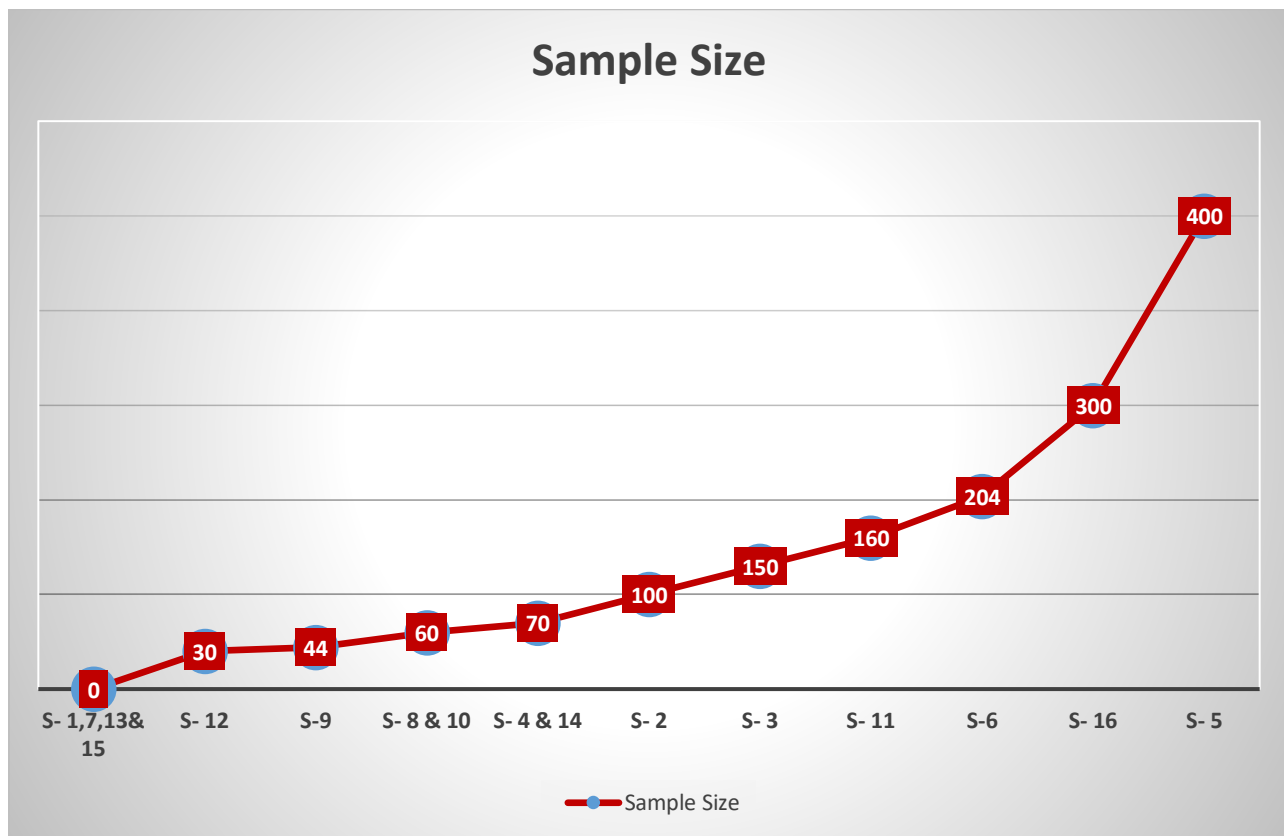


Figure 2 Sample size distribution in assertiveness training from 2018 to 2023

Impact of the nursing intervention package on prediabetes: The third objective of the study was to find out the impact of the nursing intervention package on prediabetes. Out of 15 studies, 2 studies used the IDRS scale, 7 studies used HbA1c and FBS, and 2 studies Used self-prepared questionnaires. 4 studies did not explain how they assess the nursing intervention package.

Data Analysis Methods: The fourth objective of the study was to understand the data analysis methods used in the studies. Most of the studies used frequency, percentage, mean and standard deviation for continuous variables, a chi-square test for categorical variables and a t-test for comparison. One study used Fisher's test for categorical variables. Three studies mentioned that they used SPSS software for data analysis.

Procedure of nursing intervention package: The main aim of the study was to understand the procedure of the nursing intervention package and its effect. The time for the intervention ranged from 1 to 3 months. All the studies concluded that nursing intervention packages are effective in reversing prediabetes and preventing the development of diabetes in future.

Conclusion

The present review of the literature reveals that in most of the studies, the sample size was more to draw the generalizations of the study and also the sampling technique used was non-probability in the majority of the studies. Though it is seen that the intervention package is effective in reversing the prediabetes and preventing the development of diabetes in future, among adults, but still there is a very little literature available with good quality to generalize the findings.

References

1. Smith J, Brown K, Lee A. Efficacy of nursing intervention packages in managing prediabetes among young adults. *Journal of Nursing Research*. 2023; 12(3):45-52.

2. Atlas IDFD. International Diabetes Federation. Vol. 266, the Lancet. 1955. 134–137 p. Accessed on 07/03/22.
3. Singh R, Gupta A, Sharma P. Prevalence of prediabetes in India: A state-wise analysis. *Indian Journal of Public Health*. 2022; 67(2):123-128.
4. Johnson T, Kumar S, Lee D. Growing prevalence of prediabetes and its implications for young adults: A global perspective. *Journal of Endocrinology and Public Health*. 2023;15(4):245-250.
5. Díaz-Rizzolo DA, et al. Effectiveness of a Type 2 Diabetes-prevention diet with sardine supplementation in reducing the risk of diabetes and cardiovascular events: A randomized controlled trial. *Clinical Nutrition*. 2021; 65:152.
6. Shakya P, Shrestha A. Effectiveness of a community-based intervention in preventing diabetes among individuals with prediabetes: A cluster randomized controlled trial in urban Nepal. *BMJ Nutrition, Prevention & Health*. 2023.
7. Coppel K. A mixed-methods study of early detection and prevention programs for families at risk of developing Type 2 Diabetes in Hawke's Bay, New Zealand. *BMJ Open*. 2019.
8. Koirala B, Balu V. The role of CNIP in increasing knowledge and practice for the prevention of NIDDM among adults: A quasi-experimental study in an urban community of Bangalore. *Journal of Education and Health Promotion*. 2024.
9. Diaz-Garcia M. Effectiveness of a culturally tailored diabetes prevention program for high-risk Hispanic/Latino populations in northern New Jersey: A pre-/post-intervention study. RUTGERS University Libraries. 2019.
10. Joachim-Celestin M. Feasibility and cost-effectiveness of a joint prevention/self-management intervention led by CHWs for low-income Hispanic/Latino individuals with diabetes and pre-diabetes in Southern California. *The Journal of Health Care Organization, Provision, and Financing*. 2021.
11. Hanafiah ANM. Effectiveness of the Jom Mama pre-conception intervention on waist circumference and secondary outcomes in women before conception: A non-blinded randomized controlled trial in Seremban, Malaysia. *Journal of Global Health*. 2022.
12. Kaur H. Effect of nutrition counselling on dietary and lifestyle modification for prediabetics in Ludhiana, Punjab: A quasi-experimental study. *Food and Nutrition Bulletin*. 2021.
13. Ibrahim MM. Effectiveness of a nurse-led lifestyle intervention program on self-efficacy and health-promoting behaviors in metabolic syndrome patients at Mansoura University, Egypt: A quasi-experimental study, *Egyptian Journal of Health Care*, 2020.
14. Blancas-Sánchez IM. Effectiveness of a pre-and post-nutritional intervention on anthropometric and glycemic measurements in schoolchildren: A randomized, single-blind study in rural Spain. *Nutrients*, 2020.
15. Abel SL. Influences on dietary change in adults: A qualitative study in Hawke's Bay, Aotearoa/New Zealand. *Public Health Nutrition*, 2021.
16. Mohammadnia Motlagh K. The effectiveness of education based on the theory of planned behavior in promoting a healthy lifestyle among pre-diabetic women in Arak, Iran: A cluster-randomized controlled trial, *BMC*, 2022.
17. Mosa HES. Effectiveness of a protection motivation theory-based nursing intervention in reducing diabetes risk and improving health behaviors among pre-diabetics in Menoufia University and Shebien El-kom: A quasi-experimental study, *Tanta Scientific Nursing Journal*, 2022.
18. Bennasar-Veny M. Modifiable factors associated with the persistence of prediabetes and progression to type 2 diabetes among adult workers in Spain: A cohort study, *Nutrients* 2020.
19. Hyder KM. Effectiveness of muscle-specific indoor exercises in the early management of prediabetes: A community-based prospective interventional study in Kerala and Tamil Nadu, South India. *Journal of Natural Science, Biology and Medicine*, 2021.