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RESEARCH ARTICLE

A CROSS SECTIONAL STUDY ON ASSESSMENT OF THE RISK OF DEVELOPING TYPE2 DIABETES MELLITUS USING INDIAN DIABETIC RISK SCORE (IDRS) AMONG THE FEMALE SANITARY WORKERS OF A TERTIARY CARE CENTRE IN CHENGALPATTU DISTRICT, TAMILNADU

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Abstract

Introduction: Currently 537 million peoples globally and 74.2 million peoples in India are living with Diabetes. This is projected to 134 million in India and 783 million globally by 2045 . This study uses Indian Diabetic Risk Score for assessment of risk status in sanitary workers in tertiary care centre .

Objective: 1.To assess the risk of developing Type2 Diabetes Mellitus using Indian Diabetic Risk Score (IDRS) among the female sanitary workers of a tertiary care centre in Chengalpattu . 2. To classify the risk status using Random Blood Sugar level among the study participants.

Methodology: A cross sectional study was conducted among 103 female sanitary workers in Chengalpattu Medical College during June 2022 . After obtaining Institutional Ethical Committee permission ,the data was collected by using semi structured questionnaire. Anthropometric measurements and Random Blood Sugar testing were done and IDRS risk score was assessed. The data was entered in Microsoft Excel and analyzed using SPSS version 25.

Result : The mean age of the study participant was 42.43 ± 8.182 years . Among the 103 study participants , 65.0% had medium risk, 25.2% had high risk . There was a statistically significant association was found between increase in age(p=0.000*) , Waist Circumference(p=0.000*) , and BMI (p=0.006*) with IDRS risk status.

Conclusion: Majority of the study participant belonged to medium risk followed by high risk group. Hence IDRS is a simple and cost effective screening tool for early identification of risk of developing Diabetes.

Introduction:-

Diabetes as a non communicable disease is significant public health problem the prevalence rate all the world over is raising.Currently 537 million peoples globally and 74.2 million peoples in India are living with Diabetes. This is projected to 134 million in India and 783 million globally by 2045[(1)]. The global Diabetes prevalence in 2019 was

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9.3% (463 million people), rising to 10.2% (578 million) by 2030 and 10.9% (700 million) by 2045. The prevalence is higher in urban (10.8%) than rural (7.2%) areas, and in high-income (10.4%) than low-income countries (4.0%). One in two (50.1%) people living with Diabetes do not know that they have Diabetes[(2)]. The global prevalence of impaired glucose tolerance is estimated to be 7.5% (374 million) in 2019 and projected to reach 8.0% (454 million) by 2030 and 8.6% (548 million) by 2045. There are about 1.3 billion people in India — roughly four times the population of the United States. However, 72.9 million people in India had Diabetes as of 2017, which rose from 40.9 million in 2007.These numbers are expected to rise, too. It's estimated that there will be 134 million people living with Diabetes in India by 2045[(3)] . The incidence of Diabetes Mellitus and its risk factors vary from place to place in India. Many studies have shown that the prevalence of Diabetes Mellitus is more in urban areas than rural areas. Diabetes causation is multifactorial and includes genetic factors coupled with environmental influences such as obesity associated with rising living standards, steady urban migration and lifestyle changes, which has resulted in rapid increase in its prevalence.

The government of India has initiated the National Programme for Prevention and control of Cancer, Diabetes, Cardiovascular disease and Stroke (NPCDCS) in 2010 by Ministry of Health and Family Welfare, with focus on strengthening infrastructure, human resource development, health promotion early diagnosis, management and referral. For such programme to be successful, it is necessary to determine the cost effective method for identifying undiagnosed Diabetic cases in our country[(4)]. Tamilnadu government has initiated Makkalai Thedi Maruthuvam (MTM) Scheme on 5th August 2021 . Those above 18 years of age would be screened for non-communicable diseases, mainly for Diabetes and Hypertension at the centre and others with infirmities through routine door to door check- ups and detect non communicable diseases that are also seen to cause sudden mortalities and impact the quality of life[(5)] .

With almost half of the Diabetic remaining undiagnosed, the use of a simple, easy to use, non invasive and cost effective screening tool for community based screening is the need of the hour. Apart from identifying this hidden part of the ice berg, will also help in promoting awareness among the people regarding disease preventive and health promoting measures. The Indian Diabetes Risk Score (IDRS) developed by Mohan et al[(6)](Madras Diabetes Research Foundation) as a part of CURES study has been found to be a highly sensitive , specific and cost effective tool in community based screening for Diabetes Mellitus. The component of Indian Diabetic Risk Score include age, waist circumference, physical activity and family history of Diabetes Mellitus.This study was conducted to find out the Diabetic risk status among the female sanitary worker of a tertiary care centre and its application to identify undiagnosed Diabetes in the above study participants.

Objective:-

1. To assess the risk of developing Type2 Diabetes Mellitus using Indian Diabetic Risk Score (IDRS) among the female sanitary workers of a tertiary care centre in Chengalpattu .
2. To classify the risk status using Random Blood Sugar level among the study participants.

Methodology:-

Study Settings, Design And Period:

A cross sectional study was conducted among the female sanitary workers of a Tertiary care centre in Chengalpattu district about the assessment of the risk of developing Diabetes Mellitus using Indian Diabetic Risk Score (IDRS)(n = 103). The study period was June 2022.

Inclusion And Exclusion Criteria :

All the female sanitary workers of 18 years and above were included in this study. Those who were not willing to participate and known cases of Diabetes Mellitus were excluded .

Sample Size Calculation And Sampling Method:

Based on study conducted by Mani et al[(7)] , 59% were classified under high risk category. This proportion is used for sample size calculation , with relative precision of 17% and 10% non response rate , the sample size arrived was 103. Sampling method was simple random sampling .

Data Collection Procedure:
After obtaining Institutional Ethical Committee permission , the data was collected by face-to-face interview using a semi structured questionnaire. The interview was conducted privately and assured of the confidentiality of the interview. WHO COVID-19 prevention protocols such as using face mask, maintaining physical distancing, and using hand sanitizer were followed during data collection time.

Data Collection Tool:
Data was collected by using semi structured questionnaire. Anthropometric measurements and Random Blood Sugar testing were done and IDRS(Indian Diabetic Risk score) risk score was assessed. The components of Indian Diabetic risk score include age, waist circumference, physical activity and family history of Diabetes. Minimum Score is 0 and Maximum is 100. Interpretation: score < 30 Low risk , score 30 – 50 Medium risk and score >60- High risk. Height and weight measurements were taken and BMI was calculated. The BMI cut off values for Asian Indians as recommended by the WHO was used in the present study. A desirable BMI according to the WHO recommended cut-offs for Asians is considered to be between 18.5 and 22.9 kg/m2. A BMI of 23–24.9 kg/m2 is defined as "overweight" and ≥25 kg/m2 as "obese". Random Blood Glucose (RBS) was also estimated in central lab of Chengalpattu Medical College Hospital, permission obtained from HOD of Pathology Department, Chengalpattu Medical College .The questionnaire were designed and translated in local language . Informed consent was obtained from the participants before the interview. **Data Analysis:** The data was entered in MS Excel and analyzed using SPSS Version 25. Appropriate descriptive and inferential statistical analysis were done .

Results:-

Table 1:- Socio-Demographic Profile of the Female Sanitary Workers.(n=103).

Characteristics	Category	Frequency (n=103)	Percentage (%)
Age group	Less than 35 years	15	14.6
	35 to 49 years	69	67.0
	more than 50 years	19	18.4
Educational status	Illiteracy	29	28.2
	Primary education	25	24.3
	Middle school education	26	25.2
	High school education	16	15.5
	Higher secondary education	3	2.9
	Degree	4	3.9
Family	Nuclear family	82	79.6
	Joint family	16	15.5
	3-Generation family	5	4.9
Religion	Hindu	90	87.4
	Christian	9	8.7
	Muslim	4	3.9
Socio Economic Status	Upper middle	3	2.9
	Lower middle	14	13.6
	Upper lower	61	59.2
	Lower	25	24.3

As shown in Table1,Among 103 study participants, 69 (67%) were 35 to 49 years followed by 19(18.4%) more than 50 years and 15(14.6%) less than 35 years. Among the study population 29(28.2%) were illiterate and 75(71.8%) were literate. 82(79.6%) were belonged to nuclear family type and 61(59.2%) came under upper lower class according to modified BG Prasad classification of socio economic status .

Table 2:- Clinical profile of the Female Sanitary Workers.(n=103).

Characteristics	Category	Frequency (n=103)	Percentage (%)
BMI	Under weight	3	2.9
	Normal weight	23	22.3
	Over weight	21	20.4
	Obese	56	54.4
Waist Circumference	Less than 80 cms	50	48.5
	80 to 89 cms	37	36.0
	More than 90 cms	16	15.5
Risk based on IDRS	Low risk	10	9.8
	Medium risk	67	65.0
	High risk	26	25.2

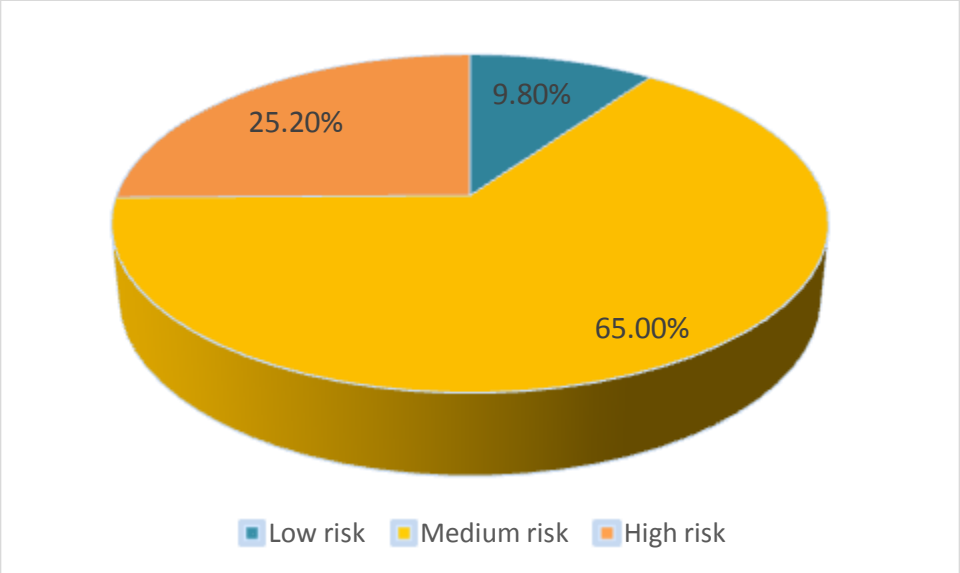
As shown in Table 2, 56(54.4%) were obese based on BMI. Among the study participant 16 (15.5%) were with waist circumference of more than 90 cms. Based on IDRS risk score 67(65%) were at medium risk followed by 26 (25.2%) high risk group.

Table 3:- Distribution of study participant according to IDRS risk score. (n=103).

Variables	Frequency(%) (n=103)	Score
AGE GROUP (Years)		
< 35	15(14.6%)	0
35 to 49	69(67.0%)	20
> 50	19(18.4%)	30
WAIST CIRCUMFERENCE		
Less than 80 cms	50(48.5%)	0
80 to 89 cms	37(36.0%)	10
More than 90 cms	16(15.5%)	20
PHYSICAL ACTICITY		
Exercise (regular)+Strenuous work	0	0
Exercise (regular) or Strenuous work	103(100%)	20
No exercise and sedentary work	0	30
FAMILY HISTORY		
No family History of DM	91(88.3%)	0
Father or Mother DM	10(9.8%)	10
Both parent DM	2(1.9%)	20

As shown in Table 3 , most of the study participants belonged to 35 to 49 years age group. Among the study participants 16(15.5%) were with waist circumference of more than 90 cms and 12 (11.7%) members had family history of Diabetes Mellitus.

Figure 1:- Risk of developing Diabetes Mellitus among patients (n =103).



As shown in Figure 1 , 65% of study participants belonged to medium risk group , 25.2% belonged to high risk group and only 9.8% came under low risk group according to IDRS risk status. This shows majority of the study participant belonged to medium risk followed by high risk group.

Table 4:- Association between age group and IDRS risk status. (n=103).

Variables		**IDRS Risk Status**			**Test value Df**	**p value**
		Low risk	**Medium risk**	**High risk**		
Age group	Less than 35 years (n=15)	10(66.7%)	5(33.3%)	0(0%)	Chi-square 76.522 df=4	0.000*
	35 to 49 years(n=69)	0(0%)	54(78.3%)	15(21.7%)		
	more than 50 years(n=19)	0(0%)	8(42.1%)	11(57.9%)		

As shown in Table 4. Most of the study participant came under medium risk of IDRS risk status. Among the age group more than 50 years out of 19, 11 participants came under high risk group. This shows increased age strongly associated with increased risk of developing Diabetes Mellitus. A statistically significant association was seen between the age group and IDRS risk status (p=0.000*).

Table 5:- Association between BMI category and IDRS risk status (n=103).

Variables		**IDRS Risk Status**			**Test value Df**	**p value**
		Low risk	**Medium risk**	**High risk**		
BMI	Under weight (n=3)	0(0%)	3(100%)	0(0%)	Chi-square 17.965 df = 6	0.006*
	Normal weight (n=23)	5(21.7%)	17(73.9%)	1(4.3%)		
	Over weight (n=21)	3(14.3%)	15(71.4%)	3(14.3%)		
	Obese (n=56)	2(3.6%)	32(57.1%)	22(39.3%)		

Shown in Table 5 ,total of 67 (65%) individuals belonged to the medium risk group and 26 (25.2%) individuals belonged to the high risk group. Among the high risk group 22 (84.6%) out of 26 were found to be obese. Thus, it is noted that with increase in BMI of the study participants the percentage of the individuals belonging to risk group also increased. A statistically significant association was seen between the BMI and IDRS risk status (p=0.006*).

Table 6:- Association between waist circumference category and IDRS risk status. (n=103).

Variables		IDRS Risk Status			Test value Df	p value
		Low risk	Medium risk	High risk		
Waist Circumference	Less than 80 cms (n=50)	9(18.0%)	41(82.0%)	0(0%)	Chi-square 76.522 df=4	0.000*
	80 to 89 cms (n=37)	1(2.7%)	22(59.5%)	14(37.8%)		
	More than 90 cms (n=16)	0(0%)	4(25.0%)	12(75.0%)		

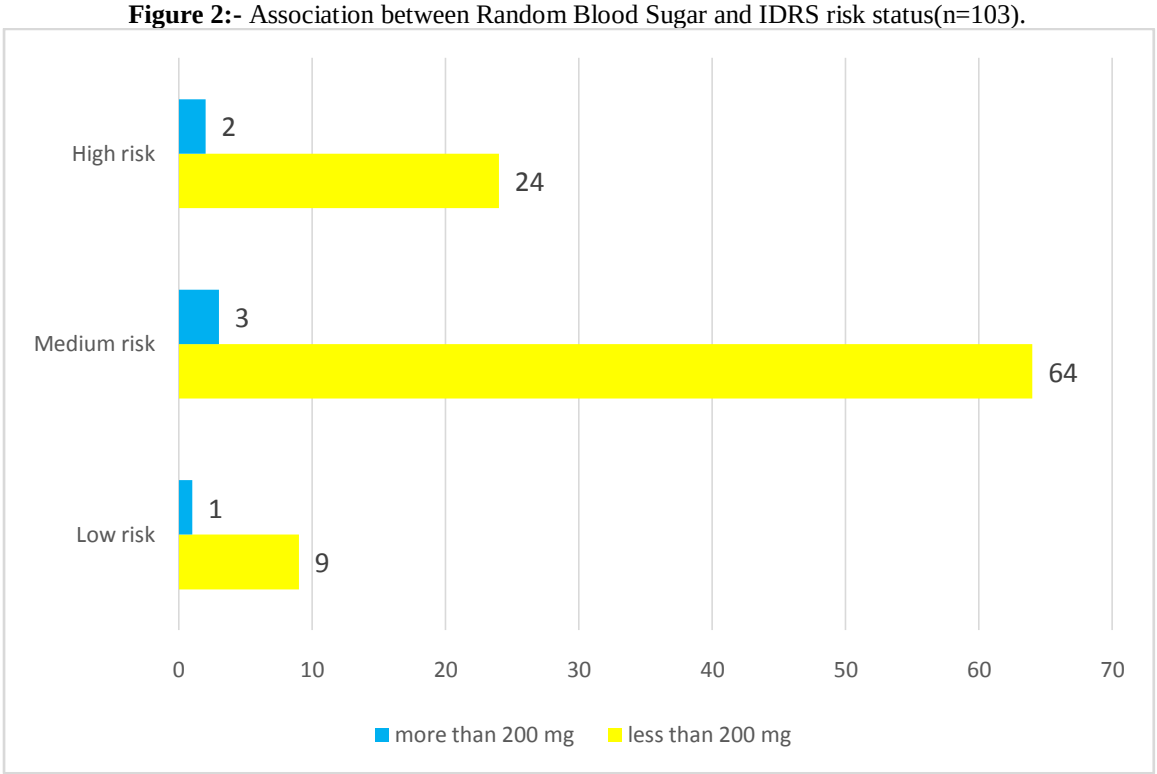
As shown in Table 6, Total of 67 (65%) participants belonged to the medium risk group. Out of 16participants of category III(more than 90 cms) 12(75%) participants came under high risk group. Thus, it is noted that with increasing waist circumference of the study population the percentage of the individuals belonging to risk group also increased. A statistically significant association was seen between the waist circumference of the study subjects and the IDRS risk status (p = 0.000*).

Table 7:- Asssociation between Family history of diabetes mellitus and IDRS risk Status. (n=103).

Family History of DM		IDRS Risk Status			Test value Df	p value
		Low risk	Medium risk	High risk		
Family History	No family history of DM(n=91)	9(9.9%)	62(68.1%)	20(22.0%)	Chi-square 7.655 df=4	1.105
	Father or Mother DM(n=10)	1(10%)	5(50%)	4(40%)		
	Both parents DM(n=2)	0(0%)	0(0%)	2(100%)		

As shown in table 7, total of 67(65%) study participants belonged to medium risk group and 5 of them had family history of Diabetes Mellitus . Among the 26(25.2%)belonged to high risk group, 6(23.07%) of them had family history of Diabetes Mellitus .

Figure 2:- Association between Random Blood Sugar and IDRS risk status(n=103).



As shown in Figure2,RBS was measured for all the study subjects irrespective of their risk Status. Among the study subjects, 6 (5.8%) were found to have an RBS value more than the cut off (i.e. >200 mg/dl), of which 3 (50%)

subjects belonged to medium risk group, 2 (33.33%) belonged to high risk group and 1 (16.66%) person belonged to low risk group. These subjects were advised for further investigations to confirm the Diabetes status by fasting and post prandial blood glucose estimation.

Discussion:-

In this study the risk status of female sanitary workers developing Diabetes Mellitus was assessed by using Indian Diabetic Risk Score (IDRS) . The present study identified 25.2% of the subjects to be in the high risk category according to IDRS. In a study by Mohan et al [6]43% , Gopinath et al [8] 43.7% reported of their study subjects were in high risk group. In a similar study conducted by Nandeswar et al [9], Stanley et al [10], Lt col puja dudeja et al [11]they found 28.4% ,17.6% , 28.9% of their study population to have a high risk score. In this study, 65% of the subjects were found to be in moderate risk category according to IDRS, similar to the findings obtained by Nandeswar et al [9] .

In present study was noted that with higher the age group , waist circumference , BMI, and family history of Diabetes Mellitus of the study population, the percentage of the individuals belonging to the high risk group also increased which is similar to the findings obtained by other studies Oruganti et al[12] , Traore et al[13] , Patil et al[14] , Gopinath et al [8]. In this study 88% of the study subjects did not have any family history of Diabetes, similar to the study conducted by Gopinath et al [8] , Oruganti et al[12], Patil RS et al [14], where 88% , 86% and 89% of the individuals did not have any family history of Diabetes. In a study conducted by Gupta SK et al[15] in urban Pondicherry, their study observed that 68.5% of the respondents had no family history of Diabetes. This difference could be due to lack of awareness about the disease and lack of screening tests at the community level to detect the cases of Diabetes in rural areas. Of the 26 subjects who belonged to high risk group according to IDRS in the present study, 7.6% had RBS value >200mg/dl. Similar findings was obtained in a study done by Gopinath et al[8], in which 12.5% of the subjects in high risk group had RBS value of >200mg/dl.

Although various risk factor scoring systems Ramachandran et al[16] , Finnish Diabetes Risk Score **(**FINDRISC)[17] , and LA FINDRISC [18]were developed previously, IDRS developed by Mohan et al[6] is considered to be one of the strongest predictors of incidence of Diabetes in India. IDRS uses two non-modifiable risk factors (age and family history of Diabetes) and two modifiable risk factors (waist circumference and physical activity) giving a clear message that if the modifiable risk factors are altered the risk score can be considerably reduced.

Conclusion:-

Majority of the study participant belonged to medium risk followed by high risk group. There was a statistically significant association was found between increase in age(p=0.000*) , Waist Circumference(p=0.000*) , and BMI (p=0.006*) with IDRS risk status. Among the study participants 6 (5.8%) were found to have an RBS value more than the cut off(>200 mg/dl) . Hence IDRS is a simple and cost effective screening tool for early identification of risk of developing Diabetes.

Limitation:

This study was conducted in single institution in Chengalpattu district during Covid-19 pandemic . In future more research has to be done to find out population-based prevalence rate of risk factors of Diabetes among the young.

Recommendation:-

1. People with RBS value more than the cut-off value have to undergo further confirmatory testing and management.
2. High risk and medium risk category of IDRS were advised to implement lifestyle modifications and dietary changes.
3. Promotion of lifestyle modifications and behavior change communication can be instituted at the earliest to prevent/delay onset of Diabetes Mellitus and its complications in later life .
4. Yoga and meditation should be given to all workers at Institution level and advised them to follow it in routine life.
5. Health education about risk factors , signs and symptoms of Diabetes among the younger generation for early identification and treatment at the earliest to prevent/delay onset of Diabetes Mellitus and its complications in later life.

6. Recommends routine screening with diagnostic tests for type 2 Diabetes for all adults age 30 or older and for the following groups: 1)People younger than 30 who are overweight or obese , 2)Women who have had gestational Diabetes , 3) People who have been diagnosed with pre-diabetes , 4)Children who are overweight or obese and who have a family history of type 2 Diabetes .

Statement Of Ethics:
Institutional Ethics Committee , Chengalpattu Medical College, Chengalpattu; Approval Number: IEC-CMC/Approval/19/2022

Conflict Of Interest:
None.

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