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Research Article

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Knowledge and Awareness of Exercises in Diabetes Mellitus among Female Population

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ABSTRACT

Introduction: Diabetes mellitus is influenced by multi-factorial components, such as behavioural, environmental and social factors. Exercises are considered to be very effective in prevention, care and management of diabetes, but the awareness of exercises in diabetes is limited and underutilized. As knowledge is essential in bringing alteration in behaviour, it is important to know the awareness. The awareness of community-based knowledge in rural population is necessary as it reduces the burden in the society by promoting health education.

Aims/Objectives: To find the knowledge and awareness of exercises and its types in diabetes mellitus among female population, and to find the association between the knowledge and awareness of diabetes based on age and level of education.

Method: This study is a cross-sectional study involving 195 females between the age of

18 and 60 years who were interviewed by the personal investigator using a structured questionnaire form which is structured in a way to find the age, level of education, knowledge and awareness of diabetes mellitus, its risk factors, complications, prevention and management of diabetes mellitus by different types of exercises.

Results: Results suggested that even though there is a good awareness of a diabetes mellitus as a condition (100%), people lacked knowledge and awareness in various aspects of diabetes mellitus such as risk factors (81.3 %), prevention (70.3%), type of exercises (aerobic exercises: 94.0%, resistance exercises: 33.2% and flexibility exercises: 31.0%), role of exercises in diabetes mellitus and exercise induced hypoglycemia (60%). Association between the knowledge & awareness of diabetes mellitus based on educational status revealed that literacy rate plays an important role in influencing a person's knowledge.

Conclusion: This study established that even though people are aware of a condition called diabetes mellitus, the knowledge regarding its risk factors, prevention, complications and type of exercises are grossly inadequate.

Key Words: Awareness, Knowledge, Diabetes Mellitus, Exercises, Prediabetes, Females

INTRODUCTION

Diabetes is an emerging epidemic of present 21st century.[1] In India, the prevalence of diabetes is rapidly gaining the status of a potential epidemic, where more than 62 billion individuals are diagnosed with diabetes. In 2000, India came into first place in the world with highest number of people with diabetes mellitus diagnosed.[2] Diabetes mellitus is influenced by multi-factorial components, such as behavioural, environmental and social factors. Physical inactivity, increased levels of sedentary behaviour, unhealthy dietary lifestyle and obesity are the independent risk factors for impaired glucose tolerance and insulin resistance. Exercises are considered to be very effective in prevention, care and management of diabetes, but the awareness of exercises in diabetes is limited and underutilized. Exercises improve glycaemic control, cardio-respiratory fitness, cardiovascular risk, physical functioning and well-being in people with pre-diabetes and with diabetes.[3] Combination of minimum of 150 min of moderate-to-vigorous intensity aerobic activity (walking and/or jogging), at least for 3 days a week and resistance exercise for 60 minutes per week, at least 2 days a week, along with flexibility exercise is beneficial in prevention of diabetes among high-risk population.[4]

As knowledge is essential in bringing alteration in behaviour, it is important to know the awareness. Once the awareness is attained it is easy to make the individuals participate in prevention and control activities.[5] The awareness of community-based knowledge in rural population is necessary as it reduces the burden in the society by promoting health educa-

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tion. Awareness of exercises helps in prevention of diabetes mellitus and promotion of healthy lifestyle among them.

METHODS

Study design: Cross sectional Study

Participants: Females between 18 and 60 years of age residing at Harekala Village, Mangaluru

Sample Size: Based on 5% level of significance and 7% margin of error and prevalence of 43% study required a sample size of 195

Procedure: Subjects were screened using inclusion and exclusion criteria. Those who fulfil the criteria were included in the study. 195 females between the age of 18 and 60 years were interviewed by the personal investigator using a structured questionnaire form which is structured in a way to find the age, level of education, knowledge and awareness of diabetes mellitus, its risk factors, complications, prevention and management of diabetes mellitus by different types of exercises. All subjects signed an institutionally approved informed consent statement prior to the data collection.

Statistical Methods

The collected data was analysed by using frequency and percentage. Association between the knowledge and awareness of exercises in diabetes mellitus based on age & educational status was analysed using chi square test. Level of significance was set as P<0.05. SPSS version 22 was used to analyse the data.

RESULTS

Table 1: Frequency Distribution of Age and Education

		Frequency	Percentage
Age	<30 years	89	45.6
	>30 years	106	54.4
Education	Primary school	14	7.2
	Senior Secondary	88	45.1
	High school	61	31.3
	Graduation/Post graduation	32	16.4

Table 1 showed the frequency distribution of age and education of included participants, of which 45.6 % belongs to an age group of 30 years. Educational status included 7.2 % of participants belonging to primary school, 45.1% to senior secondary, 31.3 % to high school and 16.4% belonging to graduation/ post-graduation, suggesting a larger number of participants had senior secondary level of education.

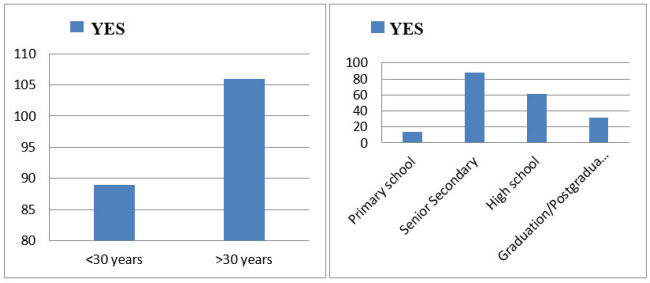

Figure 1: Awareness of Diabetes Mellitus among participants

Figure 1 showed the awareness of diabetes mellitus among participants, indicating that all 195 participants included in the study were aware of a condition called diabetes mellitus (100%), out of which 89 belonged to an age group of< 30 years and 106 to an age group of >30 years. Also, among them, 14 had primary school education, 88 had senior secondary education, 61 had high school education and 32 were graduates/post-graduates.

Table 2: Knowledge of Diabetes Mellitus among participants

Knowledge	Response	Frequency	Percentage
Diabetes is a condition of increased blood sugar level	Correct	171	87.7
	Unsure	19	9.7
	Wrong	5	2.6
Diabetes is a condition of Decreased blood sugar level	Correct	14	7.2
	Unsure	19	9.7
	Wrong	162	83.1
Normal blood sugar level is 80-160 mg/Dl	Correct	76	39.0
	Unsure	103	52.8
	Wrong	16	8.2
A person is said to be diabetic, If the blood sugar level is more than 200 mg/dL	Correct	109	55.9
	Unanswered	7	3.6
	Unsure	54	27.7
	Wrong	25	12.8
Frequent feeling of thirst is a symptom of diabetes mellitus	Correct	125	64.1
	Unanswered	2	1.0
	Unsure	36	18.5
	Wrong	32	16.4
Frequent urination is a symptom of diabetes mellitus	Correct	98	50.3
	Unanswered	5	2.6
	Unsure	38	19.5
	Wrong	54	27.7

Table 2: *(Continued)*

Knowledge	Response	Frequency	Percentage
Tiredness and weakness is a symptom of diabetes mellitus	Correct	97	49.7
	Unanswered	2	1.0
	Unsure	37	19.0
	Wrong	59	30.3
Depression is a symptom of diabetes mellitus	Correct	70	35.9
	Unanswered	7	3.6
	Unsure	34	17.4
	Wrong	84	43.1
Increased desire for sweets is a symptom of diabetes mellitus	Correct	113	57.9
	Unanswered	10	5.1
	Unsure	14	7.2
	Wrong	58	29.7
Slow healing of cuts and wounds is a symptom of diabetes mellitus	Correct	105	53.8
	Unanswered	4	2.1
	Unsure	29	14.9
	Wrong	57	29.2
Regular check-up of blood sugar (every 3 months) is important	Correct	106	54.4
	Unanswered	5	2.6
	Unsure	36	18.5
	Wrong	48	24.6

Table 2 showed the results of knowledge of diabetes mellitus among study population. It included 87.7% of participants responding the statement "diabetes is a condition of increased blood sugar level" as correct, whereas 2.6 % responded it as wrong and remaining 9.7 % were unsure. It included 83.1 % wrong, 9.7 % unsure and 7.2 % correct response for the statement "diabetes is a condition of decreased blood sugar level" whereas only 39 % of subjects knew that normal blood sugar level is 80-160 mg/dL and 55.9 % knew that a person is said to be diabetic if his blood sugar level is >200 mg/dL. Knowledge on symptoms of diabetes mellitus was as follows. 64.1 % on frequent feeling of thirst, 50.3 % about frequent urination, 49.7% about tiredness and weakness, 35.9 % about depression, 57.9 % about increased desire for sweets, and 53.8 % about slow healing of cuts and wounds. 54.4 % of study subjects knew that regular check-up of blood sugar (every 3 months) is important.

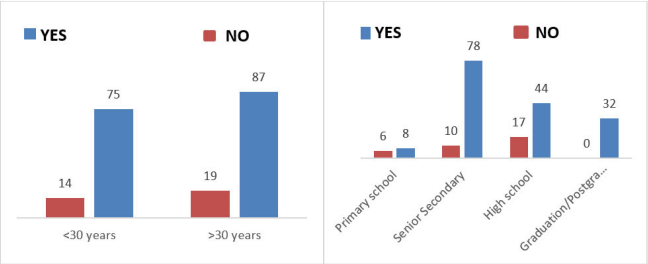

Figure 2: Awareness of Diabetes Mellitus risk factors among participants.

Figure 2 showed the results of awareness of diabetes mellitus risk factors. It showed that 83.1% of participants were aware of the diabetes mellitus risk factors of which, 75 (84.30%) belonged to an age group 30 years. 16.9 % were not aware of diabetes mellitus risk factors which included 14 (15.70%) and 19 (17.90%) belonging to an age group of 30 years respectively. Among participants who were aware of diabetes mellitus risk factors 8 (57.1%) had primary school education, 78 (88.6%) had senior secondary level of education, 44 (72.1%) had high school education and 32 (100%) were 14 19 75 87 30 years YES NO 6 10 17 0 8 78 44 32 YES NO 20 graduates/postgraduates. 6 (42.9%) were having primary school education, 10 (11.4%) were having senior secondary education, 17 (27.9%) were having high school education and none (0%) were graduates/postgraduates among the participants who were unaware of diabetes mellitus risk factors.

Table 3: Knowledge of Diabetes Mellitus risk factors among participants

Knowledge	Response	Frequency	Percentage
Obesity	Correct	116	71.6
	Unsure	28	17.3
	Wrong	18	11.1
Decreased physical activity	Correct	63	38.9
	Unsure	49	30.2
	Wrong	50	30.9
Smoking	Correct	80	49.4
	Unsure	38	23.5
	Wrong	44	27.2
Family history of diabetes	Correct	94	58.0
	Unsure	32	19.8
	Wrong	36	22.2
Unhealthy food habits like eating lots of sweets	Correct	110	67.9
	Unsure	30	18.5
	Wrong	22	13.6

Table 3 showed that results of knowledge of diabetes mellitus risk factors included the following percentages of participants having knowledge about various diabetes mellitus risk factors. 71.6 % about obesity, 38.9% knew that decreased

physical activity is a risk factor for diabetes mellitus, smoking included 49.4 %, 58.0 % knew that family history of diabetes is a risk factor and 67.9 % considered unhealthy food habits like eating lots of sweets as risk factor for developing diabetes mellitus.

Table 4: Awareness and Knowledge of complications of DM

Knowledge	Response	Frequency	Percentage
Do you know diabetes can affect other body parts?	No	14	7.2
	Yes	181	92.8
Kidneys	Correct	130	71.8
	Unsure	28	15.5
	Wrong	23	12.7
Eyes	Correct	134	74.0
	Unsure	12	6.6
	Wrong	35	19.3
Feet/hands	Correct	129	71.3
	Unsure	19	10.5
	Wrong	33	18.2
Nerves	Correct	68	37.6
	Unsure	64	35.4
	Wrong	49	27.1
Heart	Correct	47	26.0
	Unsure	90	49.7
	Wrong	44	24.3

Table 4 showed the results of awareness and knowledge of complications of diabetes mellitus. Out of studied 195 participants, 92.8 % were aware that diabetes mellitus could affect other parts of the body whereas remaining 7.2% were unaware of it. Among participants who were aware of diabetes mellitus complications, 8 (57.1%) had primary school education, 84 (95.5%) had senior secondary education level, 57 (93.4%) had high school education level and 32 (100%) were graduates/post graduates. Also 85 (95.50%) belonged to an age group of 30 years. Among subjects who were unaware of diabetes mellitus complications, 4 (4.50%) belonged to an age group of 30 years, 6 (42.9%) had educational level of primary school, 4 (4.5%) had senior secondary level of education, 4 (6.6%) had high school education level and none (0%) were graduates/ postgraduates Results of knowledge of diabetes mellitus complications included following percentages of included participants having knowledge of following body parts being affected by diabetes mellitus. Kidneys- 71.8%, Eyes- 74.0%, Feet/hands- 71.3%, Nerves- 37.6%, Heart- 26.0%

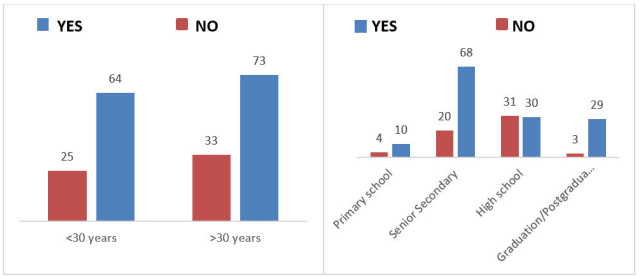

Figure 3: Awareness of prevention of Diabetes Mellitus among study population

Figure 3 showed the results of awareness of prevention of diabetes mellitus. For the statement "diabetes can be prevented", 70.3% responded as YES and remaining 29.7% responded as NO. Among the participants who were aware of diabetes mellitus prevention, 64 (71.90%) belonged to an age group of 30 years. Also 10(71.4%) had primary school education level, 68(77.3%) were having senior secondary level of education, 30(49.2%) had high school education and 29(90.6%) were graduates/ post graduates. Among the participants who were unaware of diabetes mellitus prevention, 25 (28.10%) falls to an age group of 30 years. 4(28.6%) were having primary school education, 20(22.7%) senior secondary level of education, 31(50.8%) high school educational status and 3(9.4%) were graduates/ post graduates

Table 5: Knowledge about prevention of Diabetes Mellitus among study population

Knowledge	Response	Frequency	Percentage
Adopting healthy lifestyle	correct	129	94.2
	Unsure	4	2.9
	wrong	4	2.9
Diet	correct	114	83.2
	unsure	7	5.1
	wrong	16	11.7
Exercises	correct	91	66.4
	unanswered	1	0.7
	unsure	29	21.2
	wrong	16	11.7

Table 5 showed that 94.2 % of participants knew that diabetes could be prevented by adopting healthy lifestyle, 83.2 % had knowledge on diet as prevention of diabetes mellitus and only 66.4 % knew that exercises could prevent diabetes mellitus.

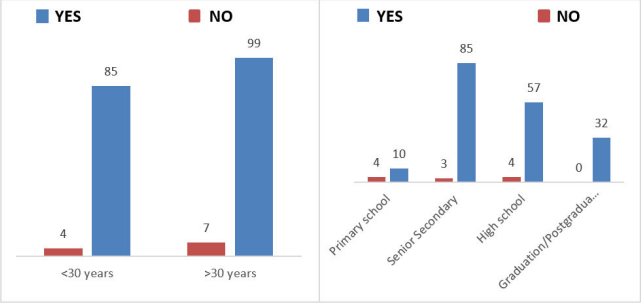

Figure 4: Awareness about exercises in Diabetes Mellitus among study population.

Figure 4 showed awareness of exercises in diabetes mellitus among participants was 94.4%. It included 85 females (95.50%) of age group 30 years. Also, among them, 10(71.4%) were having primary school education, 85(96.6%) had senior secondary level of education, 57(93.4%) were high school educated and 32(100%) were graduates/post graduates. Remaining 5.6% were unaware about the role of exercises in diabetes mellitus management. It included 4 (4.50%) females of an age group 30 years YES NO 4 3 4 0 10 85 57 32 YES NO 24 7 (6.60%) females of an age group >30 years. Also, it included 4(28.6%) primary school educated females, 3(3.4%) senior secondary educated, 4(6.6%) high school educated females.

Table 6: Knowledge about exercises in Diabetes Mellitus among study population

Knowledge	Response	Frequency	Percentage
Exercise may help in controlling blood sugar level	Correct	126	68.5
	Unanswered	22	12.0
	Unsure	22	12.0
	Wrong	14	7.6
Exercise may decreases body weight(fat reduction)	Correct	149	81.0
	unanswered	8	4.3
	Unsure	17	9.2%
	Wrong	10	5.4%
Exercise may help in preventing the complications of diabetes	Correct	88	47.8%
	unanswered	4	2.2%
	Unsure	32	17.4%
	Wrong	60	32.6%
Exercise may reduce the risk of heart diseases	Correct	81	44.0%
	unanswered	20	10.9%
	Unsure	26	14.1%
	Wrong	57	31.0%

Figure 6 showed regarding the knowledge about exercises in diabetes mellitus, 68.5 % of females included in the study knew that exercise may help in controlling blood sugar level, 81.0% knew that exercise may decrease body weight (fat reduction), 47.8 % knew about the importance of exercise in prevention of diabetes mellitus complication and 44% knew that exercise may reduce the risk of heart diseases

Table 7: Awareness and Knowledge of type of exercises in DM

Description	Response	Frequency	Percentage
Exercises like walking, jogging, cycling etc.(aerobic exercises) are beneficial in diabetes	Correct	173	94.0
	Unsure	10	5.4
	Wrong	1	0.5
Exercising with weights (resistance exercises) are beneficial in diabetes	Correct	61	33.2
	Unsure	33	17.9
	Wrong	90	48.9
Flexibility exercises (like stretching exercises) should also be included as a part of regular exercise	Correct	57	31.0
	unanswered	9	4.9
	Unsure	41	22.3
	Wrong	77	41.8
People should do exercises for most days of week for at least 30 minutes	Correct	130	70.7
	Unanswered	2	1.1
	Unsure	27	14.7
	Wrong	25	13.6
People should do exercises once a week for at least 30 minutes	Correct	66	35.9
	Unanswered	40	21.7
	Unsure	43	23.4
	Wrong	35	19.0
People should do exercises once a month for one hour	Correct	12	6.5
	unanswered	46	25.0
	Unsure	45	24.5
	Wrong	81	44.0
People should do exercises for minimum of twice weekly for 30 minutes	Correct	19	10.3
	unanswered	60	32.6
	Unsure	38	20.7
	Wrong	67	36.4

Table 7 showed the result of awareness and knowledge of type of exercises in DM. 94.0% of participants had knowledge about aerobic exercises (exercises like walking, jogging, cycling etc.) in the management of diabetes mellitus. 33.2% had knowledge about resistance exercises (exercising with weights) in diabetes and only 31% had knowledge about flexibility exercises. Regarding the knowledge of frequency of exercises in diabetes mellitus, 70.7% of study subjects knew that people should do exercises for most of days of week for at least 30 minutes. 35.9% of study subjects thought that doing exercises once a week for at least 30 minutes is sufficient, whereas 6.5% thought that doing exercises once a month for one hour might be the 26 correct frequencies of

exercises in diabetes mellitus and remaining 10.3% reported the statement "people should do exercises for minimum of twice weekly for 30 minutes as correct."

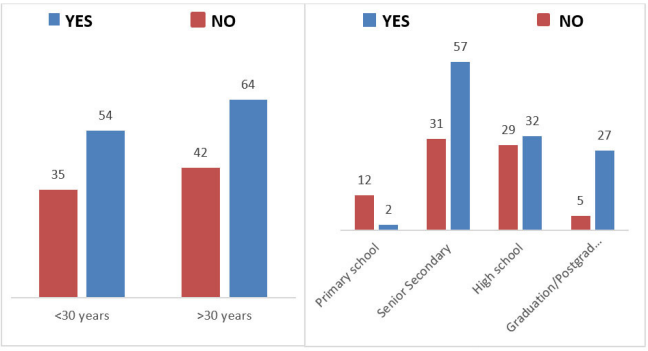

Figure 5: Awareness of risk of exercise induced hypoglycaemia.

Figure 5 showed among participants, 60.5% were aware of risk of exercise induced hypoglycaemia. Among them, it included 54 (60.70%) females with an age group of 30 years. Also, it included 2(14.3%) primary school educates, 57(64.8%) senior secondary educates, 32(52.5%) high school educates and 27(84.4%) graduates/post graduates. 39.5% of study subjects were unaware of risk of developing exercise induced hypoglycaemia. Among them, it included 12(85.7%) primary school educates, 31(35.2%) senior secondary educates, 29(47.5%) high school educates and 5(15.6%) graduates/ post graduates. Also 35 (39.30%) and 42 (39.60%) belonged to an age group 30 years respectively

Table 8: Knowledge of risk of exercise induced hypoglycaemia

Knowledge	Response	Frequency	Percentage
Immediately take diabetes tablets/ Medications	Correct	84	71.2
	Unsure	7	5.9
	Wrong	27	22.9
Rest and wait until they feel better	Correct	73	61.9
	Unsure	8	6.8
	Wrong	37	31.4
Take diabetes tablets even before starting of exercise	Correct	50	42.4
	Unsure	25	21.2
	Wrong	43	36.4
Immediately take some sugary food or drink	Correct	64	54.2
	Unsure	26	22.0
	Wrong	28	23.7

Table 8 showed regarding the knowledge about risk of exercise induced hypoglycaemia, 71.2% of participants reported the statement "immediately take diabetes tablets/medications" as correct, 61.9% reported the statement "rest and wait until they feel better" as correct, 42.4% thought that taking diabetes tablets even before starting of exercise is helpful in preventing the risk of exercise induced hypoglycaemia, whereas 54.2 % had knowledge about immediately taking some sugary food or drink.

Table 9: Association of Age with variable

Description	Response	Frequency	AGE		P value
			<30 years Count	>30 years Count	
Are you aware of a condition called diabetes?	Yes	195	89	106	
Do you know what the risk factors for the development of diabetes are?	No	33	14	19	0.684
	Yes	162	75	87	
Do you know diabetes can affect other body parts?	No	14	4	10	0.183
	Yes	181	85	96	
Do you know diabetes can be prevented?	No	58	25	33	0.643
	Yes	137	64	73	
Do you know that exercises may help in management of diabetes?	No	11	4	7	0.525
	Yes	184	85	99	
Exercises like walking, jogging, cycling etc.(aerobic exercises) are beneficial in diabetes	Correct	173	78	95	0.365
	Unsure	10	6	4	
	Wrong	1	1	0	
Exercising with weights (resistance exercises) are beneficial in diabetes	Correct	61	30	31	0.558
	Unsure	33	17	16	
	Wrong	90	38	52	

Table 9: *(Continued)*

Description	Response	Frequency	AGE		P value
			<30 years Count	>30 years Count	
Do you know there is a risk of sudden decrease in the blood sugar during or after the exercise?	NO	77	35	42	0.966
	Yes	118	54	64	
Flexibility exercises (like stretching exercises) should also be included as a part of regular exercise	Correct	57	26	31	0.473
	Unanswered	9	2	7	
	Unsure	41	21	20	
	Wrong	77	36	41	
Do you know there is a risk of sudden decrease in the blood sugar during or after the exercise?	NO	77	35	42	0.966
	YES	118	54	64	

Table 9 showed age group was divided into 2 categories:<30 years and >30 years. Association of the variables regarding knowledge and awareness of diabetes mellitus, its risk factors, prevention, complications, exercises as management of diabetes, types of exercises and risk of exercise induced hypoglycaemia and age were analysed using chi square test and results showed no statistical significant association suggesting that age did not have a statistically significant association with the knowledge and awareness of diabetes mellitus and its associated variables.

Table 10: Comparison of the awareness between the different grades of education

Description	Response	Frequency	Primary school	Senior Secondary	High school	Graduation/Post graduation	P value
Are you aware of a condition called diabetes?	Yes	195	14	88	61	32	
Do you know what the risk factors for the development of diabetes are?	No	33	6	10	17	0	<0.001
	Yes	162	8	78	44	32	
Do you know diabetes can affect other body parts?	No	14	6	4	4	0	<0.001
	Yes	181	8	84	57	32	
Do you know diabetes can be prevented?	No	58	4	20	31	3	<0.001
	Yes	137	10	68	30	29	
Do you know that exercises may help in management of diabetes?	No	11	4	3	4	0	0.001
	Yes	184	10	85	57	32	
Exercises like walking, jogging, cycling etc. (aerobic exercises) are beneficial in diabetes	Correct	173	9	79	54	31	0.924
	Unsure	10	1	5	3	1	
	Wrong	1	0	1	0	0	
Exercising with weights (resistance exercises) are beneficial in diabetes	Correct	61	3	28	21	9	0.194
	Unsure	33	4	19	5	5	
	Wrong	90	3	38	31	18	
Flexibility exercises (like stretching exercises) should also be included as a part of regular exercise	Correct	57	5	27	18	7	0.463
	Unanswered	9	0	6	3	0	
	Unsure	41	2	15	16	8	
	Wrong	77	3	37	20	17	
Do you know there is a risk of sudden decrease in the blood sugar during or after the exercise?	NO	77	12	31	29	5	<0.001
	Yes	118	2	57	32	27	

Table 10 showed educational status of participants was classified into 4 levels namely primary school, high school, senior secondary and graduation/ post-graduation. Association between these educational levels of participants and knowledge & awareness of diabetes mellitus, its risk factors, complications, preventions, role of exercises, type of exercises in diabetes mellitus, risk of exercise induced hypoglycaemia was analysed using chi square test. Results showed a statistical significant association between the educational status and awareness of diabetes mellitus (P= <0.001), awareness of diabetes mellitus risk factors (P=<0.001), awareness on complications of diabetes mellitus (P=<0.001), awareness on prevention of diabetes mellitus (P=<0.001), awareness about exercises in diabetes mellitus (P= 0.001) and awareness on risk of exercise induced hypoglycaemia (P= <0.001). However, there was no statistical significant association between the educational level and knowledge about the type of exercises in diabetes mellitus (P= 0.924, P= 0.194 and P= 0.463).

DISCUSSION

Results suggested that even though there is a good awareness of diabetes mellitus as a condition, people lacked knowledge and awareness in various aspects of diabetes mellitus such as risk factors, prevention, type of exercises, role of exercises in diabetes mellitus and exercise induced hypoglycaemia. Even though there was 100% awareness of people about the condition called diabetes mellitus, they lacked knowledge in normal blood sugar level (39.0%), when the person is said to be diabetic (55.9%) and also regarding the symptoms of diabetes mellitus like frequent feeling of thirst (64.1%), frequent urination (50.3%), tiredness & weakness (49.7%), depression (35.9%), and slow healing of cuts and wounds (53.8%). Also, there was a misconception among the study subjects that symptom of diabetes mellitus include increased desire for sweets (57.9%). (Table 2)

Results on awareness and knowledge of diabetes mellitus risk factors showed 81.3 % of study population having awareness on it. Among the results on knowledge of complications of diabetes mellitus there was a good awareness on percentage of study population knowing that diabetes mellitus may affect other parts of body such as kidneys (71.8%), eyes (74%), and feet/hands (71.3%). But there was a poor knowledge regarding diabetes mellitus affecting nerves (37.6%) and heart (26.0%) (Table 3 & 4). There was 70.3% of awareness on prevention of diabetes mellitus and its knowledge showed good percentage of study subjects having knowledge about adopting healthy lifestyle (94.2%) and diet (83.2%) as a preventive measure in developing diabetes mellitus. But exercises, which is considered as an effective modality for the prevention and treatment of type 2 diabetes showed a poor knowledge (66.4%) among study population. (Table 5)

These results suggest that people lack basic knowledge in diabetes mellitus which might interfere with the self-management of the condition which is considered as an important aspect in diabetes mellitus. Results are in accordance with a study done by

Muninarayana et al. in the year 2010 which also showed poor relevant knowledge and awareness about diabetes in rural population emphasizing a need for community level awareness program and extension of diabetes education activities in rural areas.[6] M Deepa et al. in the year 2005 also reflected poor knowledge and awareness of diabetes mellitus in urban areas.[7] Sridhar M et al. in his study showed that awareness about diabetes is insufficient among the population resulting in poor knowledge in prevention and management of diabetes.[8]

Exercise therapy plays an important role in the prevention and treatment of diabetes mellitus with multiple complicated mechanisms.[9] 94.4% of study population was aware that exercises are helpful in management of diabetes mellitus (figure 4). But the knowledge of exercises including its types (except for aerobic exercises), its role and frequency to be performed in management of diabetes mellitus was poor among study participants. Exercise can increase the risk of hypoglycaemia in insulin-dependent diabetes mellitus, causing irritability, confusion, and even seizures and unconsciousness.[10] Awareness of risk exercise induced hypoglycaemia among participants was 60.0% (figure 5).

Association between educational status knowledge & awareness of diabetes mellitus showed a statistical significant association (table 10).This result suggests that literacy level plays an important role in assessing one's knowledge and awareness. A study done by Bains SS et.al titled "Associations between health literacy, diabetes knowledge, self-care behaviours, and glycaemic control in a low-income population with type 2 Diabetes" reported that limited health literacy appears to exert its influence through diabetes knowledge.[11]

CONCLUSION

This study established that even though people are aware of a condition called diabetes mellitus, the knowledge regarding its risk factors, prevention, and complications are grossly inadequate. Exercises, which are considered to be feasible and efficient in management of diabetes mellitus, contributed a good awareness among participants. However, people lacked knowledge on type of exercises, its frequency, role of exercises in diabetes mellitus and also regarding the risk and management of exercise induced hypoglycaemia. Results emphasizes a need of community level health education and awareness programs especially concentrating the rural female population which might help in prevention and self-management of

diabetes mellitus to an extent as knowledge and awareness is essential in bringing alteration in behaviour.

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REFERENCES

1. Brown RL. Assessing for Awareness and Knowledge Regarding Diabetes in Pre-Diabetes Obese Patients, Walden University ProQuest Dissertations Publishing. 2017; 10620824.
2. Kaveeshwar SA, Cornwall J. The current state of diabetes mellitus in India. Australas Med J. 2014;7(1):45-8
3. Hordern MD, Dunstan DW, Prins JB, Baker MK, Singh MA, Coombes JS. Exercise prescription for patients with type 2 diabetes and pre-diabetes: a position statement from Exercise and Sport Science Australia. JSAMS. 2012 Jan 1; 15(1):25-31.
4. Mendes R, Sousa N, Almeida A, Subtil P, Guedes-Marques F, Victor MR et al. Exercise prescription for patients with type 2 diabetes—a synthesis of international recommendations: narrative review. Br J Sports Med. 2016 Nov 1; 50(22):1379-81.
5. Somannavar S, Lanthorn H, Deepa M, Pradeepa R, Rema M, Mohan V. Increased awareness about diabetes and its complications in a whole city: effectiveness of the "prevention, awareness, counseling and evaluation" [PACE] Diabetes Project [PACE-6]. Journal of the Association of Physicians of India. 2008 Jul 1;56(7):495-502.
6. Muninarayana C, Balachandra G, Hiremath SG, Iyengar K, Anil NS. Prevalence and awareness regarding diabetes mellitus in rural Tamaka, Kolar. Int J Diabetes Dev Ctries. 2010 Jan; 30(1):18-21.
7. Deepa M, Bhansali A, Anjana RM, Pradeepa R, Joshi SR, Joshi PP et al. Knowledge and awareness of diabetes in urban and rural India: The Indian Council of Medical Research India diabetes study (phase I): Indian Council of Medical Research India diabetes 4. Indian J Endocrinol Metab. 2014 May; 18(3):379-85.
8. Sridhar M, Ramasubramanian A. General Awareness of Diabetes Mellitus among a Hospital Population in Chennai: A Survey. Indian Journal Public Health Research & Development. 2020 Jan 31; 11(1):12-5.
9. Yang D, Yang Y, Li Y, Han R. Physical exercise as therapy for type 2 diabetes mellitus: From mechanism to orientation. Ann Nutr Metab. 2019; 74(4):313-21.
10. Younk LM, Mikeladze M, Tate D, Davis SN. Exercise-related hypoglycemia in diabetes mellitus. Expert Rev Endocrinol Metab. 2011 Jan 1; 6(1):93-108.
11. Bains SS, Egede LE. Associations between health literacy, diabetes knowledge, self-care behaviors, and glycemic control in a low-income population with type 2 diabetes. Diabetes Technol Ther. 2011 Mar 1; 13(3):335-41.