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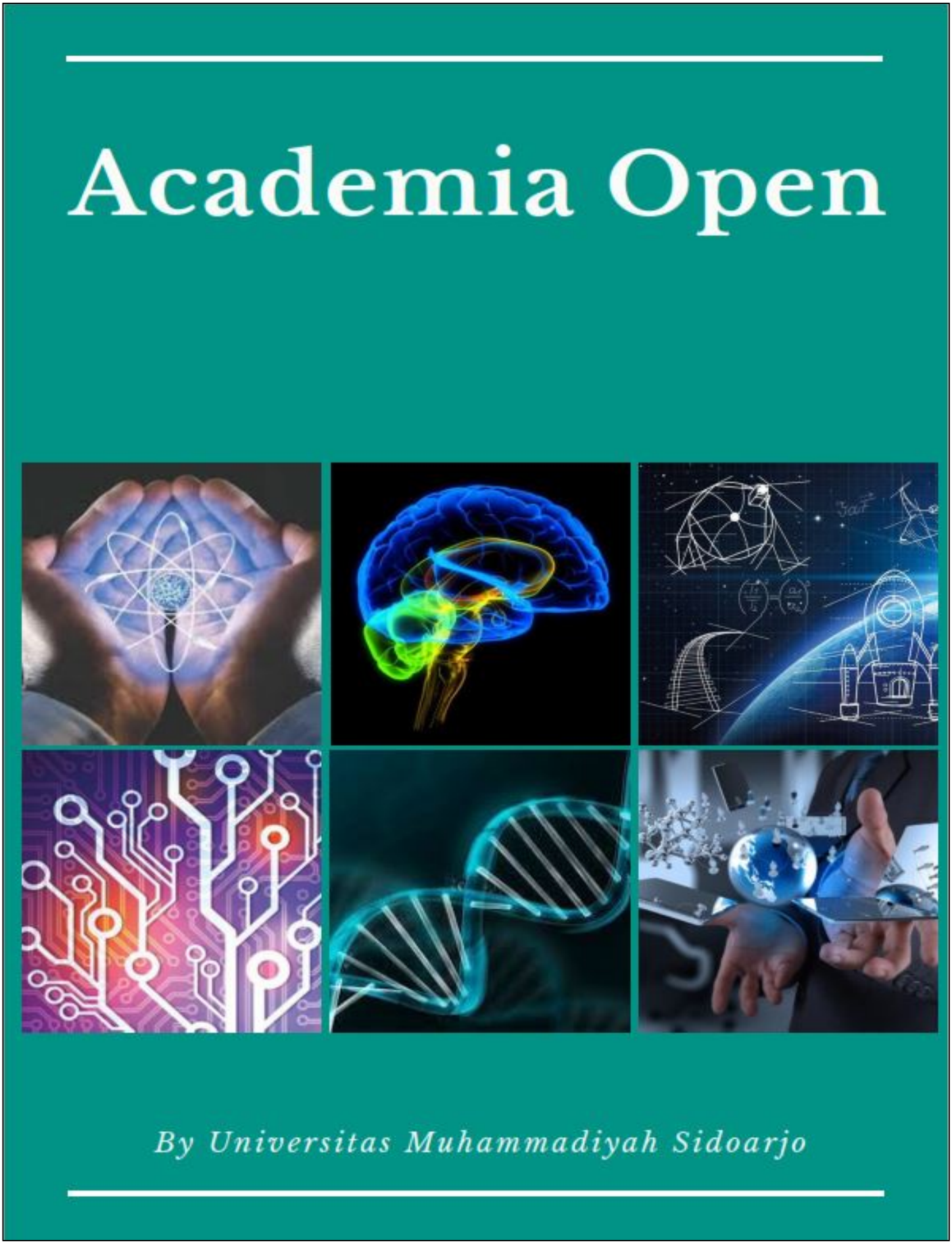


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# Knowledge, Attitudes, and Practice of Nursing Students about Insulin Therapy: A Cross-Sectional Study

## *Pengetahuan, Sikap, dan Praktik Mahasiswa Keperawatan tentang Terapi Insulin: Sebuah Studi Cross-Sectional*

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### Abstract

This study aims to assess the knowledge, attitudes, and practices of nursing students regarding insulin therapy. Conducted at the College of Nursing - University of Basrah, the research utilized a questionnaire to gather data from 200 participants over a six-month period. Results indicate a good overall level of knowledge about insulin therapy, a fair attitude towards it, and a medium level of suggested practice. Interestingly, while there was a significant correlation between participants' knowledge and gender, no discernible relationships were found between knowledge and other demographic variables, nor between attitudes and any demographic factors. This suggests the need for targeted educational interventions to improve attitudes and practices towards insulin therapy among nursing students.

**Highlights:**

- Varied knowledge levels among nursing students.
- Positive attitudes towards insulin therapy.
- Need for tailored educational interventions.

**Keywords:** Knowledge, Attitudes, Practice, Nursing Students, Insulin Therapy

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# Introduction

A disorder in the metabolism of proteins, fats, and carbohydrates that was caused by either inadequate insulin secretion, resistance to the hormone's effects, or both. According to a survey by the According to the International Diabetes Federation, 382 million people had diabetes in 2013 and 592 million people are predicted to have the disease by 2035. [1].

Type I diabetes mellitus is distinguished from type II diabetes mellitus and gestational diabetes mellitus by an insulin deficit that needs daily insulin therapy. Pregnancy-related hyperglycemia is known as gestational diabetes, but ineffective insulin use by the body is the cause of type II diabetes mellitus. In many instances, insulin therapy is a crucial component of the management of type II diabetes as well as a cornerstone of treatment for type I diabetes. Despite this, 20% of individuals purposefully miss their doses of insulin, and at least 33% of Individuals neglect to take their insulin. as directed. As several non-pharmacological interventions must be performed in addition to drugs to effectively control diabetes mellitus, patient involvement is vital [2]. Because of this, controlling hyperglycemia requires proper insulin and oral medicine delivery; using the wrong method might have negative health effects [3], [4].

The pancreatic islets of Langerhans contain beta cells that release insulin, which travels straight into the circulation and affects the target cells of the liver, muscle, thyroid, and other tissues [5]. Insulin controls the production of carbohydrates from sugar and starch in these tissues. People with diabetes either do not produce any insulin at all or have a severe deficiency of it, therefore they must daily take calibrated quantities of insulin [6]. Since stomach acids impair the under-the-skin location of insulin injection, oral administration is not recommended [7]. Without the proper insulin action, the body cannot store glucose in the liver or muscles or build any fat. Endocrinologist Irl Hirsh, MD, asserts that fat is broken down and produces keto acids.. An imbalance in these acids' levels may result in diabetic ketoacidosis, a potentially lethal illness if the levels become too high. A normal person's pancreas releases insulin when they eat because their blood glucose levels increase, allowing the sugar to be stored as energy for later use. Without such pancreatic function, type 1 or advanced type 2 diabetics risk having blood sugar levels that are either dangerously high or dangerously low [8].

The sides of The four places are the thighs, the abdomen, the backs of the upper arms, and the upper outer buttocks. that may safely receive insulin injections. Rotating insulin injection sites should be done, and a methodical approach should be used, to prevent lumps and scar tissue on the skin. Therefore, the belly, outer thigh, back of the arm, and flank/buttock areas are all possible locations for injections. The rotation locations are shown visually. Compared to insulin injected into the thigh, insulin administered into the belly works more quickly. The pace at which insulin given into the arm absorbs varies depending on whether it is injected into the belly or the thigh [9], [10].

Although insulin injections often don't hurt too much, repeatedly injecting in the same location might result in inflammation, an increase in fat tissue (Lipohypertrophy), or scarring. Poor insulin absorption caused by Lipohypertrophy or scarring may influence insulin release, resulting in early postprandial hyperglycemia and/or delayed hypoglycemia [11].

rotating injectables sites to avoid lipohypertrophy and scarring and increase the predictability of insulin absorption and activity is crucial. methods for rotating injection locations are suggested. Rather than moving to different locations for every injection, rotation should happen inside the same location for at least a month. Each injection should be spaced a fingerbreadth (2.5 cm) from the one before. Utilizing the same location reduces insulin absorption variations daily. Avoid going near an area that has blisters or open sores. When changing locations, blood glucose monitoring should be done. Change in the injection site is usually linked to hypoglycemia.

When using a syringe to deliver medicine, the needle should be entered swiftly yet gently and withdrawn from the skin at the same angle. When using a 4-mm needle, it must be entered at a 90-degree angle. The 4-mm needle should only be used by extremely thin people and very young toddlers (6 years old). the needle being inserted perpendicularly into a flap of skin. To reduce the danger of IM injections, injections should always be delivered into a raised skinfold when using any syringe needle on children (6 years old), teenagers, or slender to normal-weight adults (BMI of 19–25). Lifting a skinfold is not necessary when injecting at a 45° angle with a 6-mm syringe needle because of the greater net penetration A 6-mm needle measures around 4 mm.7 Others may use the 4-mm needle to inject without having to raise a skinfold.6 To assist in preventing leaking and ensure injecting the entire amount of medicine, when giving the medication with a pen, press the thumb button before waiting for a slow count of 10.1, 7 Patients should be instructed to wait until the dosage dial in the dosing window has returned to "0" before withdrawing the needle [12].

# Method

This research was conducted at the University of Basrah's nursing college between November 20, 2022, and May 21, 2023. It is a descriptive cross-sectional study. Students from the College of Nursing at the University of Basrah

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were enrolled in the study at any level (first-year, second-year, third-year, and fourth-year students) and for both morning and evening classes. A convenient sample consisting of (200) students of both genders was included in the study. A questionnaire consisting of close-ended questions was used for data collection. The questionnaire included four parts: The first part consisted of (7 items) related to the socio-demographic and clinical characteristics of the participants including age, gender, academic year, type of study, mother education, and residency. The second part of the questionnaire consisted of (11 questions) regarding participants' knowledge about insulin therapy. The third part of the questionnaire consisted of (10 questions) regarding participants' attitudes about insulin therapy. The fourth part of the questionnaire consisted of (17 questions) regarding participants' suggested practice about insulin therapy.

Frequency and percentage were used for analyzing the socio-demographic and clinical characteristics of the participants. Likert's three-point scale was used to assess the level of participants' knowledge and attitude, calculation mean score, and level of significance. Scoring of the answers regarding knowledge and attitudes as shown; 3 for Yes, 2 for I don't know, 1 for No. Assessment of the participants' knowledge and attitude level as shown according to a mean of score; Good = 2.24 – 3, Fair = 1.67 – 2.23, and Poor = 1–1.66. Significance of the participants' knowledge and attitudes level as shown; MOS > 2 Significant and MOS < 2 Non – significant. The grand mean score is used to assess the overall level of participants' knowledge and attitudes.

Frequency and percentage were used to assess the level of suggested practice, the traditional method of calculating grades uses (100 %) as a measure for scoring, as shown; Excellent from 90% and to 100%, Very goodfrom 80 to less than 90%, Good from 70 to less than 80%, Intermediate from 60 to less than 70%, Accepted from 50 to less than 60%, Poor Less than 50%. Correlation between the participants' knowledge and attitude and their socio-demographic and clinical characteristics using Pearson's correlation coefficient and P-value at 0.05 level.

# Results and Discussion

## A. Results

This study shows that; a whole of 200 The research includes participants, two-third 133 (66.5 %) among the individuals involved were female, and the majority of the participants 180 (90%) were in the age group (15 - 25 years), the highest number of participants 76 (38%) were in the fourth year, they were distributed according to the type of the study; 117 (58.5%) were in the morning study while 83 (41.5) were in the evening study, a minority of the participants 18 (9%) were working before joining the college and distributed as (9 in the hospitals, 3 primary health care centers and 6 in other non-healthcare institutes).

This study shows that the participants have a good level of knowledge in nine items they have been asked about regarding insulin therapy including artificial synthesis of the insulin, types of insulin, the main effect of insulin on blood sugar, the timing of insulin therapy concerning the meals, sites of insulin injection in the body, the best place to store insulin, local massage and its effect on insulin absorption, complications of insulin, availability of insulin, while they have a fair level of knowledge regarding two items only: the main source of human insulin synthesis in the human body and the rotatory method for using insulin to avoid its local complications. They show significant knowledge concerning all items about insulin therapy they have been asked about.

This study shows that the participants have a good level of attitude in four items they have been asked about regarding insulin therapy including complications of insulin therapy, shaking of insulin vial before usage, hand washing before insulin injection, attendance of educational lectures about insulin therapy, while they have a fair level of attitude regarding five items including the real effect of insulin on blood sugar, the effect of healthy diet and exercise on insulin requirement, addiction on insulin, insulin is the last choice of treatment, the effect of insulin on body weight, they show poor attitudes level regarding one item: insulin therapy is considered as a stigma to the patient. They show significant attitudes for all items about insulin therapy they have been asked about, except when they asked about insulin therapy if considered as a stigma to the patient, they show poor attitude level.

This study shows an excellent level of suggested practice in two items: making sure about the type of insulin and expiry date before use, an excellent level in one item: being sure of emptying the syringe from any air bubble before injection, good level in three items: shaking of insulin vial and hand washing before injection of insulin, medium level of practice in eight items: pain associated with insulin injection, induration occurs with insulin injection, use of the proper anatomical and technical method for injection, use a rotatory method on insulin injection, poor practice in two items: reuse the syringes of insulin and if notice any infection at site of insulin injection.

The overall level of the participant's knowledge regarding insulin therapy is good (Grand mean score = 2.443). The overall level of the participant's attitude regarding insulin therapy is fair (Grand mean score = 2.266). The overall level of the participant's suggested practice regarding insulin therapy is medium (frequency = 2341, percentage = 68%).

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This study shows a significant correlation between the participant knowledge and their gender at P value = 0.05 where the P value here was higher (P = 0.007), while the knowledge as correlated with other factors and the attitude correlated with all demographic and historical variables were nonsignificant as the P value was greater than (P=0.05 level).

| Variable | | | Frequency | Percentage |
|---|---|---|---|---|
| A | Gender | Male | 67 | 33.5% |
| | | Female | 133 | 66.5% |
| | | Total | 200 | 100% |
| B | Age | 15-25 | 180 | 90% |
| | | 26-35 | 17 | 8.5% |
| | | 36-45 | 3 | 1.5% |
| | | Total | 200 | 100% |
| C | Academic year | First | 2 | 1% |
| | | Second | 54 | 27% |
| | | Third | 69 | 34.5% |
| | | Fourth | 76 | 38% |
| | | Total | 200 | 100% |
| D | Type of Study | Morning | 117 | 58.5% |
| | | Evening | 83 | 41.5% |
| | | Total | 200 | 100% |
| E1 | Any job before joining the study | Yes | 18 | 9% |
| | | No | 182 | 91% |
| | | Total | 200 | 100% |
| E2 | Place of work | Hospital | 9 | 50% |
| | | Primary HCC | 3 | %1.7 |
| | | Non–health institutes | 6 | %3.3 |
| | | Total | 18 | 100% |

**Table 1.** ***Demographic Characteristics of The Study Participants***

| No. | Variable | N. | Answer | Frequency | Percentage |
|---|---|---|---|---|---|
| A.1. | Personal history of Diabetes Mellitus | 200 | Yes | 15 | %7.5 |
| | | | No | 185 | %92.5 |
| | | | Total | 200 | 100% |
| A.2. | Do they use insulin? | 15 | Yes | 5 | 3.3% |
| | | | No | 10 | 6.7% |
| | | | Total | 15 | 100% |
| B.1. | Family history of DM | 200 | Yes | 73 | 36.5% |
| | | | No | 127 | 63.5% |
| | | | Total | 200 | 100% |
| B.2. | Do they use insulin? | 73 | Yes | 33 | 45.2% |
| | | | No | 39 | 54.8% |
| | | | Total | 73 | 100% |

**Table 2.** *Distribution of The Participant According to The History of Diabetes Mellitus and Insulin Therapy*

| Item | N | Response | | | MS | Level of knowledge | Significance |
|---|---|---|---|---|---|---|---|
| | | YES | I don’t know | NO | | | |
| Q1 | 200 | 125 | 44 | 31 | 2.47 | Good | S |
| Q2 | 200 | 96 | 43 | 61 | 2.17 | Fair | S |
| Q3 | 200 | 126 | 37 | 37 | 2.44 | Good | S |
| Q4 | 200 | 158 | 19 | 23 | 2.67 | Good | S |
| Q5 | 200 | 108 | 51 | 41 | 2.33 | Good | S |
| Q6 | 200 | 147 | 31 | 22 | 2.62 | Good | S |
| Q7 | 200 | 136 | 35 | 29 | 2.53 | Good | S |
| Q8 | 200 | 120 | 40 | 40 | 2.4 0 | Good | S |
| | | | | | | | |

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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Q9 | 200 | 73 | 63 | 64 | 2.04 | Fair | S |
| Q10 | 200 | 139 | 33 | 28 | 2.55 | Good | S |
| Q11 | 200 | 145 | 32 | 23 | 2.61 | Good | S |
| MS= mean score, S= significant N=200 | | | | | | | |

**Table 3.** ***Level of The Participant's Knowledge about Insulin Therapy***

| Item | N | Answers | | | MS | Level of attitude | Significance |
|---|---|---|---|---|---|---|---|
| | | Yes | I don't know | No | | | |
| Q1 | 200 | 124 | 44 | 32 | 2.46 | GOOD | S |
| Q2 | 200 | 95 | 43 | 62 | 2.16 | FAIR | S |
| Q3 | 200 | 125 | 37 | 38 | 2.43 | GOOD | S |
| Q4 | 200 | 25 | 77 | 98 | 1.63 | POOR | NS |
| Q5 | 200 | 140 | 32 | 28 | 2.56 | GOOD | S |
| Q6 | 200 | 77 | 54 | 69 | 2.04 | FAIR | S |
| Q7 | 200 | 154 | 29 | 17 | 2.68 | GOOD | S |
| Q8 | 200 | 105 | 54 | 41 | 2.32 | FAIR | S |
| Q9 | 200 | 103 | 49 | 48 | 2.27 | FAIR | S |
| Q10 | 200 | 70 | 76 | 54 | 2.08 | FAIR | S |
| MS= mean of score, S= significant , NS= non-significant | | | | | | | |

**Table 4.** *Level of The Participant's Attitudes about Insulin Therapy*

| Item | N | YES | | NO | | Level |
|---|---|---|---|---|---|---|
| | | Frequency | Percentage | Frequency | Percentage | |
| Q1 | 200 | 189 | 94.5% | 11 | 5.5% | Excellent |
| Q2 | 200 | 190 | 95% | 10 | 5% | Excellent |
| Q3 | 200 | 147 | 73.5% | 53 | 26.5% | Good |
| Q4 | 200 | 173 | 86.5% | 27 | 13.5% | Very good |
| Q5 | 200 | 154 | 77% | 46 | 23% | Good |
| Q6 | 200 | 135 | 67.5% | 65 | 32.5% | Medium |
| Q7 | 200 | 131 | 65.5% | 69 | 34.5% | Medium |
| Q8 | 200 | 129 | 64.5% | 71 | 35.5% | Medium |
| Q9 | 200 | 128 | 64% | 72 | 36% | Medium |
| Q10 | 200 | 153 | 76.5% | 47 | 23.5% | Good |
| Q11 | 200 | 128 | 64% | 72 | 36% | Medium |
| Q12 | 200 | 103 | 51.5% | 97 | 48.5% | Accepted |
| Q13 | 200 | 68 | 34% | 132 | 66% | Poor |
| Q14 | 200 | 92 | 46% | 108 | 54% | Poor |
| Q15 | 200 | 155 | 77.5% | 45 | 22.5% | Good |
| Q16 | 200 | 131 | 65.5% | 69 | 34.5% | Medium |
| Q17 | 200 | 135 | 67.5% | 65 | 32.5% | Medium |
| Total | 3400 | 2341 | 68.9% | 1059 | 31.1% | Medium |

**Table 5.** *Level of The Participant's Suggested Practice about Insulin Therapy*

| No. | Demographic and historical characteristics | Assessment level | | | |
|---|---|---|---|---|---|
| | | Knowledge | | Attitude | |
| 1 | Gender | P = 0.007 | (S) | P = 0.498 | (NS) |
| 2 | Age | P = 0.581 | (NS) | P = 0.782 | (NS) |
| 3 | Academic year | P = 0.658 | (NS) | P = 0.183 | (NS) |
| 4 | Type of Study | P = 0.190 | (NS) | P = 0.413 | (NS) |
| 6 | A. Personal history of DM | P = 0.278 | (NS) | P = 0.772 | (NS) |
| | B. Use of Insulin | P = 0.108 | (NS) | P = 0.463 | (NS) |
| 7 | A. Family history of DM | P = 0.711 | (NS) | P = 0.727 | (NS) |
| | B. Use of Insulin | P = 0.892 | (NS) | P = 0.727 | (NS) |

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| P = p-value (0.001), S=significant, NS= nonsignificant |
|---|

**Table 6.** *Correlation of Knowledge, Attitudes, and Suggested Practice with Demographic and Historical Characteristics of The Participants.*

## B. Discussion

The demographic information shows that the majority of the students who answered the questionnaire, 66.5%, most of them were women. of the students, 90%, were from the age group 15-25, the majority were in the fourth academic year, 38%, the morning study 58.5%, and according to the schedule, most of the students, 90%, were unemployed before joining the study 92.5% of the students did not have a personal history of diabetes 63.5% of the students did not have a high history of diabetes through the students' knowledge of insulin treatment, the result was good.

Through the attitudes about insulin treatment, the result was fair. Through practice, the result is medium, schedule 5-4 through a study in the American Journal of Pharmaceutical Education [13].

The present study agreed with other studies in Jordan [14] and the United States [15] and also revealed that nurses had inadequate knowledge of insulin administration. Similar incidences of practicing nurses not knowing enough about insulin administration were seen in Northern Ireland [16], Pakistan [17], Greece [18], and the United States [19].

It evaluated the effect of a standard patient scenario on the retention of first-stage students with the How to inject insulin. In comparison to standard teaching approaches, the intervention group exhibited considerably greater levels of knowledge and counselling abilities. Additionally, the primary endpoint and another trial indicated a little rapid increase in learning for the intervention group.

Based on the findings, it was noted that the research participants' knowledge levels were as follows: Of these, 44% have slightly sufficient understanding, 52% have insufficient knowledge, and only 4% have sufficient knowledge. Regarding insulin therapy, 27% of study participants with diabetes had a good attitude, 69% had a somewhat positive view, and 4% had an unfavourable opinion.

Eighty-two percent of participants in a London, England research regarding insulin treatment had a similar sentiment. However, a sizable portion of the study's patient population (7.3%) thought that consistent insulin use may result in addiction. A research carried out in Vietnam reported on a related concept.

In this research, about half of the subjects improperly retained insulin. This is a highly concerning circumstance since improper storage of the medication will compromise patients' ability to receive the right care.

# Conclusion

1. The study sample consisted of (200) nursing students; most of them female, and the majority of the participants were in the age group (15-25 years). Regarding the academic year; most of the participants were in the fourth year, according to the type of study; most of the students were in the morning study.

2. The overall level of the participant’s knowledge regarding insulin therapy was good.

3. The overall level of the participant’s attitude regarding insulin therapy was fair.

4. The overall level of the participant’s suggested practice regarding insulin therapy was medium.

5.There is a significant correlation between the participants’ knowledge and their gender only while showing a non-significant correlation between their knowledge and other demographic and historical variables.

6. Additionally, there was no discernible relationship between their attitude level and all demographic and historical variables.

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