Knowledge and Attitude of Nursing Students at King Abdulaziz University Regarding Down Syndrome

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ABSTRACT

Context: Down syndrome (DS) is a disorder that occurs as a result of an individual having an additional chromosome that leads to several mental and physical development issues. This syndrome brings importance to the need for nurses who have an advanced knowledge regarding Down syndrome and know how to deal with it to improve their quality of life. However, limited research has been conducted to assess future nurses' knowledge and attitudes toward Down syndrome.

Aim: This study aims to assess the level of knowledge and attitude of nursing students at King Abdulaziz University (KAU) regarding Down syndrome.

Methods: A quantitative, descriptive, cross-sectional research design was used, with an online knowledge assessment questionnaire. A purposive sample comprising 249 nursing students at the KAU Faculty of Nursing was recruited for this study.

Results: 143(57.4%) students had a high level of knowledge about Down syndrome, and 210(84.3%) had a positive attitude toward Down syndrome. High knowledge was found to be high among fourth-year students (58, 70.7%) and students aged 21 and above (105, 65.6%).

Conclusion: The study found that nursing students at the Faculty of Nursing, KAU, have strong knowledge and positive attitudes towards Down syndrome, indicating that future healthcare professionals have the potential to improve the quality of care for patients with DS. This study recommends developing targeted workshops that are enjoyable and educational, focusing on the management, prenatal screening, and social incorporation of DS content.

Keywords: Attitude, Down syndrome, knowledge, nursing students

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1. Introduction

Down syndrome (DS) or "Trisomy 21" is considered one of the most prevalent genetic disorders. It occurs when an individual carries an extra chromosome. This extra chromosome indicates they have 47 chromosomes rather than 46; as a result, it leads to both mental and physical developmental issues. Worldwide, individuals with Down syndrome are estimated to range from 1 in 1,000 to 1 in 1,100 live births. Children with Down Syndrome are more likely to develop health problems such as heart, ear, and eye problems. They are also more susceptible to infections and at risk of hearing and vision loss *(Ministry of Health, 2023; Ministry of Health, 2024)*.

This risk raises their demand for specialist medical treatment. In this case, the role of healthcare providers in treating and supporting the lives of patients with Down syndrome is very important, especially for nurses, who have a more direct involvement. Therefore, there is a need for nurses who have a high level of knowledge of Down syndrome and know how to deal with children with DS to promote and improve their quality of life in the population and increase their social inclusion, as they may face difficulty in integrating into their society due to their differences. Additionally, when reviewing the literature from different countries, the population-based studies found a lack of knowledge and a negative attitude toward people with Down syndrome *(Antonarakis et al., 2020)*.

A study conducted in India, Ahmedabad, included 188 nursing students, found that 36% had a low level of knowledge and 22% had negative attitudes toward people with Down syndrome *(Modi & Desai, 2023)*. Moreover, a study conducted in Jeddah with 1253 randomly selected nursing students found that 37% had inappropriate knowledge levels, while 47% had inappropriate attitudes *(Alhaddad et al., 2018)*.

Furthermore, studies concluded that the most significant factors affecting knowledge and attitudes toward people with Down syndrome are level of education

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and age. A cross-sectional study was conducted among 402 females visiting primary healthcare centers in Riyadh to evaluate awareness of Down syndrome, found a significant correlation between education level and awareness. Among the respondents, 20% were graduates, 5% were postgraduate, 70% were high school holders, and 5% with a primary school education. The results showed that 38.1% of females had low awareness, and 61.4% had moderate awareness. While only 0.5% had high awareness *(Shalabi et al., 2020).*

Another study involving medical and health sciences students from four colleges in the United Arab Emirates showed that 74% had a strong understanding of Down syndrome. The study found that medical students had greater knowledge compared to nursing, pharmacy, and dental students. The study found that 67.2% of participants had a positive attitude toward people with Down syndrome. Furthermore, years of study were identified as a key factor in students' knowledge and attitudes toward people with Down syndrome *(Rabbani et al., 2023).*

2. Significance of the study

A study conducted in Ha'il City, Kingdom of Saudi Arabia, revealed that 65.7% of nursing students had good awareness of DS, while 34.3% had poor awareness. The findings indicated that nursing students with university degrees demonstrated a high level of awareness (73.6%) *(Khalifa et al., 2022).* This study concluded that those with a university education have a better understanding of Down syndrome.

Moreover, health care providers are the first point of contact for patients, and their knowledge and positive attitude are essential for raising awareness about Down syndrome. A study in Saudi Arabia focused on nurses working in primary health care centers in the Al Ahsa district. Among 131 participants, 59.6% had appropriate knowledge, and 61.8% had a positive attitude toward Down syndrome. In addition, the study found that females had higher levels of knowledge and positive attitudes toward people with DS than male participants *(Alshaikh et al., 2024).*

These studies demonstrate the importance of future health providers' knowledge and attitudes, which can greatly impact the care provided to people with Down syndrome. Therefore, with Down syndrome being one of the most common chromosomal conditions in Saudi Arabia, it is necessary to bring attention to the importance of assessing the level of knowledge and attitude of undergraduate nurses to explore any need for further education, correcting false information, and removing bad stigma against individuals with Down syndrome to ensure that they will receive the best care they need. This highlights the need for additional research and for the representation of nursing students' knowledge and attitudes toward DS to detect and prevent false stigma and negative attitudes among future nurses toward individuals with DS, and to correct them.

3. Aim of the study

This study aims to assess the level of knowledge and attitude of nursing students at KAU regarding Down syndrome through

- Determining the level of knowledge of Nursing students at King Abdulaziz University towards Down syndrome.
- Evaluate the attitude of Nursing students at King Abdulaziz University towards Down syndrome.

3.1. Research questions

- What is the level of knowledge of nursing students at King Abdulaziz University regarding Down syndrome?
- What is the attitude of nursing students at King Abdulaziz University towards Down syndrome?

4. Subjects & Methods

4.1. Research Design

A quantitative descriptive cross-sectional research design was employed in this study. A quantitative descriptive cross-sectional research design is a non-experimental study design that aims to describe the characteristics, frequencies, or distributions of variables within a defined population at a single point in time *(Polit & Beck, 2021).*

4.2. Study Setting

This study was carried out at King Abdulaziz University's Faculty of Nursing in Jeddah, Saudi Arabia. It was in building 8 in the health sector. The Faculty of Nursing has 705 students. The researchers chose King Abdulaziz University's Faculty of Nursing because of their interest in assessing nursing students' knowledge and attitudes toward Down syndrome. The Faculty of Nursing had one bachelor's program and four master's programs.

4.3. Subjects

A purposive sample of undergraduate nursing students at the Faculty of Nursing, KAU, was recruited to achieve the study's aim. 1st-year nursing students were excluded because they were still in their preparatory year and had not yet started their studies at the faculty of nursing at KAU.

Sample size

The total population of nursing students at KAU is 705. The sample was calculated using a power analysis equation with a 5% error margin and 95% confidence level. The sample size was 249 nursing students, as calculated using the following equation.

$$n= N/(1+Ne^2)$$

$Ne2=705\times0.0025=1.7625$

$n=2.7625705\approx255.2.$

Six students were missing during data collection process, so the remaining students were 249.

4.4. Tools of Data Collection

4.4.1. Knowledge and Attitude Assessment Questionnaire

The research data were collected through an online knowledge questionnaire and attitude scale that has been developed by researchers through reviewing previous literature in the English language to fit the objective of this study, *Alhaddad et al. (2018); Rabbani et al. (2023); Al Shaikh et al. (2024)*.

The questionnaire consists of three parts and 25 questions. The first part of the questionnaire is the participant demographic information, which consists of five questions (age, gender, marital status, year of study, and any family history of Down syndrome).

The second part concerns nursing students' knowledge of the DS questionnaire. It aims to assess nursing students' knowledge of DS and consists of 10 multiple-choice questions (i.e., causes, risk factors, and diagnosis).

Scoring system

Each correct answer received 1 point, while each incorrect answer received 0. A score of 60% or more will be considered high-level. In comparison, less than 60% will be considered low-level.

The third part is a three-point Likert-type Scale for assessing nursing students' attitudes toward DS. It consists of 10 questions. For example, questions as if people with DS can be married, go to school, and learn in a special school.

Scoring system

Each statement was evaluated against a three-point scale from 1(disagree), 2(neutral), and 3(agree). A score of 60% or more indicates a positive attitude, while a score below 60% indicates a negative attitude.

4.5. Procedures

Ethical approval was obtained from the Faculty of Nursing, King Abdulaziz University, Jeddah, Saudi Arabia. Students who met the inclusion criteria participated voluntarily, remained anonymous, and had the right to withdraw from the study at any time without consequences. Their consent was obtained electronically at the beginning of the questionnaire, and their information was kept confidential and used solely by the researchers for this study.

The tool was assessed for validity by five experts in the medical-surgical department. All recommendations were made, and the tool was assessed for reliability using Cronbach's alpha (0.83). A pilot study was conducted on 10% of the sample to test the tool's applicability and the feasibility of the research process. The pilot results were excluded from the study sample.

Data collection proceeded after obtaining ethical approval. Data were collected via an online questionnaire distributed via the official social media platforms (WhatsApp and Telegram) for each batch of nursing students at KAU. Data was collected over 3 months from September to November 2024.

4.6. Data Analysis

Data analysis was carried out using SPSS statistical software version 29.0. Frequencies and percentages were used for the study's categorical variables. The association between participants' levels of Down syndrome knowledge and attitude and their demographic characteristics was examined using the Chi-square test for association. The Pearson correlation coefficient was computed between the knowledge and attitude scales. A multivariate analysis using binary logistic regression was conducted to identify significant predictors of Down syndrome knowledge and attitude levels. A *p*-value of less than or equal to 0.05 was set to be a significant result.

5. Results

Table 1 reveals the demographic characteristics of nursing students. A total of 249 nursing students enrolled in the study; of them, 51% were aged 21-22 years, and most (83.5%) were female students. Most (97.6%) of the students were single, and they were equally distributed across the 2nd, 3rd, and 4th grades. About 19% of respondents reported having a family member with Down syndrome.

Table 2 demonstrates nursing students' knowledge about Down syndrome. The frequency and percentage of correct responses were provided. A total of 207(83.1%) responded correctly to the question on Down syndrome causes, followed by 179(71.9%) who responded correctly to the question on people with Down syndrome having physical manifestations, and 167(67.1%) who responded correctly to the question on people with Down syndrome having cognitive impairment. Also, 62.2% of the students answered correctly the question about how the age of the expecting mother impacts the incidence of Down Syndrome. The lowest questions with correct responses were risk factors for Down syndrome and the association between hearing loss and Down syndrome (39.5%).

Figure 1 illustrates the overall attitude of nursing students. 143(57.4%) of students had a high level of knowledge (60% or more) about Down syndrome. At the same time, 42.60% of students had a low level of knowledge regarding DS.

Table 3 demonstrates attitudes of nursing students toward Down syndrome. 75.5% of the student nurses agree that children with Down syndrome can be recognized by looking at their face, 73.9% of them agreed that appropriate management of DS can improve the quality of life of the patient, prenatal testing helps to plan management of the pregnancy and delivery (72.7%), and people with DS can be integrated into the community (71.9%). The item with the lowest agreement was that children with DS will benefit from regular schooling (39.4%).

Figure 2 illustrates the attitudes of participants toward Down syndrome. This figure shows that 84.30% of students had a positive attitude toward DS. At the same time, 15.70% of students had a negative attitude regarding DS.

Table 4 reveals the association between Down syndrome knowledge level and demographic characteristics of nursing students. Significant associations were found between knowledge about Down syndrome and students' age group and year of study (p-value <0.05). The gender, marital status, and family history of Down syndrome were not significantly associated with knowledge about Down syndrome (p-value >0.05). The results showed that 65.6% of students aged 21 and above had a high level of knowledge about Down syndrome, compared to 42.7% among students aged 20 years and below. Moreover, 70.7% of students in the 4th year of study reported a high level of knowledge about Down

syndrome, compared with 42.9% among students in the 2nd year of study.

Table 5 demonstrates the association between Down syndrome attitude level and demographic characteristics of nursing students. Significant associations were found between attitude toward Down syndrome and age group and year of study among students (p-value < 0.05). The gender, marital status, and family history with Down syndrome were not significantly associated with attitude about Down syndrome (p-value >0.05). The results show that 92.5% of students aged 21 and above had a positive attitude toward Down syndrome, compared to 69.7% among students aged 20 years and below. Additionally, 92.7% of students in the 4th year of study had a positive attitude toward Down syndrome, compared with 71.4% among students in the 2nd year of study.

Table 6 shows the correlation between Down syndrome knowledge and attitude score. The correlation coefficient between Down syndrome knowledge and attitude score was 0.368 (p-value < 0.05), indicating a positive, significant correlation, suggesting that students with a high level of knowledge tend to have a positive attitude toward Down syndrome.

Table 7 shows the predictors of Down syndrome knowledge and attitude. A multivariate analysis using binary logistic regression was conducted to identify significant predictors of Down syndrome knowledge and attitude levels. The dependent variables were low-high knowledge and negative-positive attitudes. The results reveal that the age group of students was the only significant predictor (p-value < 0.05) of Down syndrome knowledge and attitude after adjusting for other variables in the study. The adjusted OR for age group in the knowledge model was 2.02 (95% CI: 1.01-4.20), indicating that students aged 21 and above were 2.02 times more likely to have a high level of knowledge about Down syndrome than students aged 20 years and younger, controlling for other confounders. The adjusted OR for age group in the attitude model was 4.15 (95% CI: 1.52-11.4), indicating that students aged 21 and above were 4.15 times more likely to have a positive attitude toward Down syndrome than students aged 20 years and younger, controlling for other confounders.

Figure 4 illustrates a positive relationship between both age and year of study with nursing students' knowledge and attitudes toward Down syndrome. Older students (21 and above) have higher mean knowledge and attitude scores than younger students. Similarly, students in higher academic years (4th year) demonstrate progressively higher scores than 2nd- and 3rd-year students. The upward trends across all graphs suggest that increased maturity and academic advancement are associated with stronger understanding and more positive attitudes toward Down syndrome.

Table (1): Frequency and percentage distribution of student nurses' demographic characteristics (n=249).

Variables	No.	%
Age group		
17-18	6	2.4
19-20	83	33.3
21-22	127	51.0
23-24	21	8.5
>24	12	4.8
Gender		
Female	208	83.5
Male	41	16.5
Marital status		
Single	243	97.6
Married	3	1.2
Divorced	1	0.4
Engaged	2	0.8
Year of study		
2nd year	84	33.8
3rd year	83	33.3
4th year	82	32.9
Does anyone in the family have DS		
No	201	80.7
Yes	48	19.3

Table (2): Frequency and percentage distribution of nursing students' knowledge about down syndrome (n=249).

Questions	No.	%
What causes Down syndrome	207	83.1
What is the diagnostic test during pregnancy for Down test	133	53.4
The age of the expecting mother impacts the incidence of Down Syndrome	155	62.2
Risk factors of Down syndrome	98	39.5
People with Down syndrome have physical manifestations	179	71.9
People with Down syndrome have cognitive impairment	167	67.1
Congenital heart disease is associated with Down syndrome	151	60.6
Vision problems are associated with Down syndrome	128	51.9
Hearing loss is associated with Down syndrome	98	39.5
Hypothyroidism is associated with Down syndrome	120	48.2

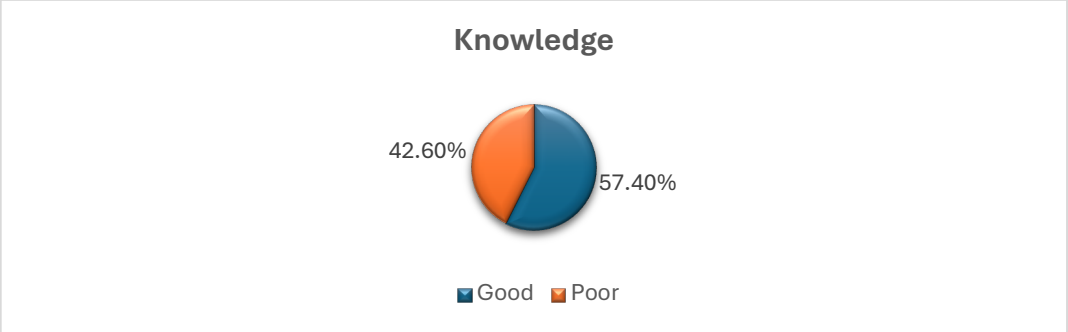

Figure (1): Percentage distribution of the total nurse student' knowledge about Downs Syndrome (n=249).

Table (3): Percentage distribution of nursing students' attitudes toward Down syndrome (n = 249).

Statements	Agree	Neutral	Disagree
Appropriate management improves quality of life	73.9	22.5	3.6
Prenatal testing helps plan management of the pregnancy and delivery	72.7	24.8	2.4
Down Syndrome children recognizable by face	75.5	17.7	6.8
Children with Down Syndrome can understand speech	63.6	28.1	8.4
Children with Down Syndrome need special schooling	82.8	6.8	10.4
Children with Down Syndrome benefit from regular schooling	39.4	43.8	16.9
DS children can maintain good peer relationships	76.3	10.9	12.9
People with Down Syndrome can live/work independently	55.8	34.8	9.4
Adults with Down Syndrome can marry and have children	71.8	24.1	4.0
People with Down Syndrome can integrate into community	71.9	24.1	4.0

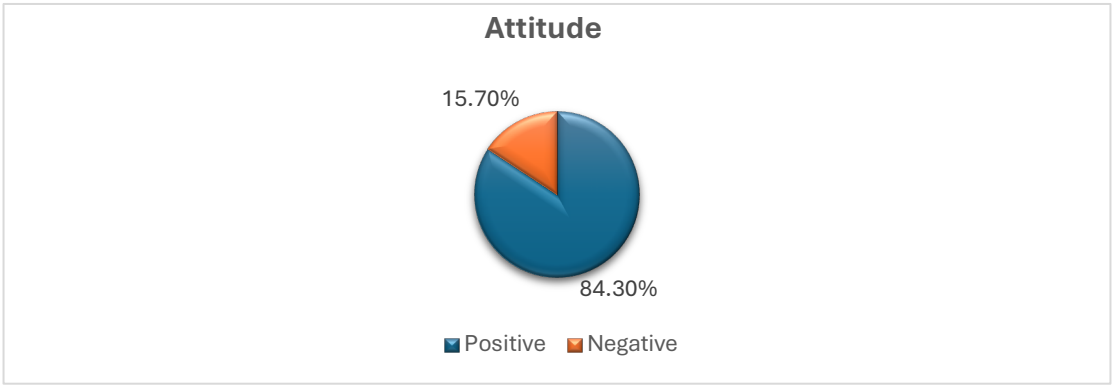

Figure (2): Percentage distribution of the total nurse student' attitude toward Down Syndrome (n=249).

Table (4): Association between Down syndrome knowledge level and demographic characteristics of nursing students.

Variable	Low		High		χ^2	P-value
	No.	%	No.	%		
Age group						
20 and less	51	57.3	38	42.7	12.291	0.001
21 and above	55	34.4	105	65.6		
Gender						
Female	92	44.2	116	55.8	1.425	0.233
Male	14	34.2	27	65.8		
Marital status						
Single	103	42.4	140	57.6	0.139	0.709
Married/ engaged	3	50.0	3	50.0		
Year of study						
2nd year	48	57.1	36	42.9	13.319	0.001
3rd year	34	41.0	49	59.0		
4th year	24	29.3	58	70.7		
Does anyone in the family have DS?						
No	89	44.3	112	55.7	1.245	0.264
Yes	17	35.4	31	64.6		

Table (5): Association between Down syndrome attitude level and demographic characteristics of nursing students.

Variables	Negative		Positive		χ^2	P-value
	No.	%	No.	%		
Age group						
20 and less	27	30.3	62	69.7	22.579	0.001
21 and above	12	7.5	148	92.5		
Gender						
Female	34	16.4	174	83.6	0.447	0.504
Male	5	12.2	36	87.8		
Marital status						
Single	38	15.6	205	84.4	0.005	0.945
Married/ engaged	1	16.7	5	83.3		
Year of study						
2nd year	24	28.6	60	71.4		
3rd year	9	10.8	74	89.2	16.379	0.001
4th year	6	7.3	76	92.7		
Does anyone in the family have DS?						
No	31	15.4	170	84.6	0.045	0.831
Yes	8	16.7	40	83.3		

Table (6): Correlation between Down syndrome knowledge and attitude score.

Scale		Knowledge	Attitude
Knowledge	Correlation	-	0.368
	P-value		0.001
Attitude	Correlation	0.368	-
	P-value	0.001	

Significant correlation at 1%

Table (7): AOR of Down syndrome knowledge and attitude levels using binary logistic regression.

Predictor	Down syndrome Knowledge			Down syndrome Attitude		
	AOR	95% CI	P-value	AOR	95% CI	P-value
Age group						
20 and less (Ref)	-	-	-	-	-	-
21 and above	2.02	1.01-4.20	0.044	4.15	1.52-11.4	0.006
Gender						
Female (Ref)	-	-	-	-	-	-
Male	1.18	0.55-2.51	0.673	0.79	0.26-2.41	0.682
Marital status						
Single (Ref)	-	-	-	-	-	-
Married/ engaged	1.52	0.29-7.91	0.618	1.27	0.12-12.9	0.841
Year of study						
2nd year (Ref)	-	-	-	-	-	-
3rd year	0.49	0.22-1.11	0.088	0.52	0.16-1.74	0.291
4th year	0.65	0.33-1.27	0.207	0.81	0.26-2.53	0.721
Family history of DS						
No (Ref)	-	-	-	-	-	-
Yes	1.96	0.96-3.99	0.064	1.35	0.53-3.42	0.528

AOR: Adjusted Odds Ratio, CI: Confidence Interval,

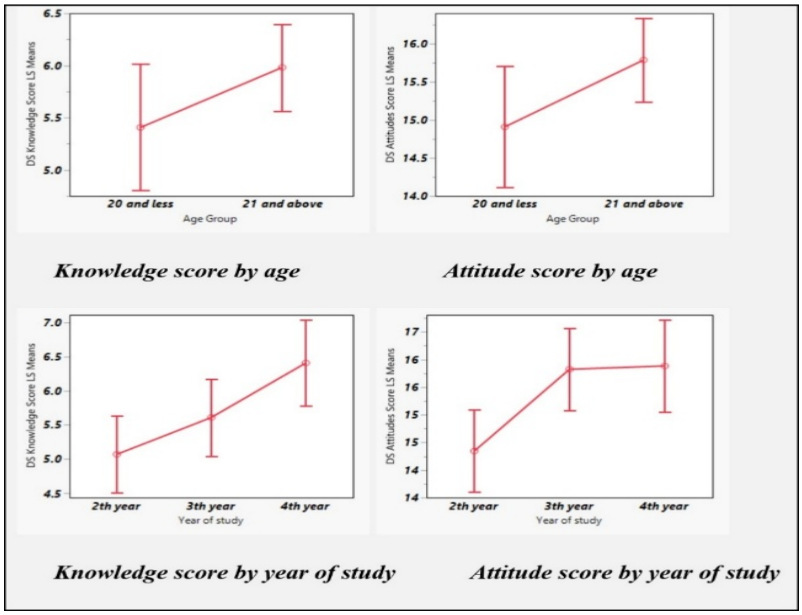

Figure (3): Mean Knowledge and Attitude Scores Toward Down Syndrome by Age and Year of Study.

6. Discussion

Health providers' knowledge and attitudes can greatly impact the care provided to people with Down syndrome. Therefore, with Down syndrome being one of the most common chromosomal conditions in Saudi Arabia, it is necessary to bring attention to the importance of assessing the level of knowledge and attitude of undergraduate nurses to explore any need for further education, correcting false information, and removing bad stigma against individuals with Down syndrome to ensure that they will receive the best care they need. The present study aims to assess the level of knowledge and attitude of nursing students at KAU regarding Down syndrome.

The findings of this study indicate high knowledge and a positive attitude among the student nurses, as more than half had a high level of knowledge about Down syndrome, and most had a positive attitude towards it. This result might be related to the nature of studying of nursing field.

These findings were similar to those of previous studies by *Alshaikh et al. (2024)* and *Rabbani et al. (2023)* regarding knowledge of DS, as both studies reported positive attitudes and high levels of knowledge among participants toward certain items, such as causes and risk factors. However, some contrasts were noted in the level of awareness regarding certain aspects, such as clinical manifestations.

On the other hand, our findings demonstrated better knowledge about certain questions, such as that children with Down syndrome can be recognized by looking at their face, appropriate management of DS can improve the quality of life of the patient, prenatal testing helps to plan management of the pregnancy and delivery, and people with DS can be integrated into the community. Also, in this study, the majority of students knew the cause of DS and answered correctly that it is a genetic condition caused by an extra chromosome. These results indicate that nursing students possess relatively strong foundational knowledge about several core aspects of Down syndrome. These findings were similar to those in the two studies, *Al Shaikh et al. (2024) and Rabbani et al. (2023).*

Compared with the findings of this study, in which more than half of the participants answered correctly to the diagnostic test during pregnancy for DS, a previous study conducted in the primary health care setting in Saudi Arabia, focusing on nursing staff, reported a lower percentage of correct responses.

Also, in this study, the findings show that around two-thirds of the participants answered correctly to the statement that the age of the expecting mother affects the incidence of Down syndrome, which highlights a knowledge gap that may be attributed to differences in educational curricula and access to updated information. A similar study conducted in the UAE at a medical and health sciences college found lower awareness of maternal age as a factor, with only 39.3% answering correctly. Similarly, another study by *Al Shaikh et al. (2024)* revealed that (25.2%) of the participants answered this question correctly.

The current study found a lower percentage of correct answers on two questions aimed at measuring students' knowledge of risk factors and hearing loss associated with DS. This finding might be related to the fact that they did not encounter any cases of DS during their clinical training. In a similar study conducted among nurses working at different primary healthcare centers in the Al Ahsa region, only 13.0% of the sample correctly answered that hearing loss is associated with Down syndrome *(Al Shaikh et al., 2024).* In contrast, a study conducted at a medical and health sciences university in the United Arab Emirates showed that 65.6% of medical and health sciences students are aware of this fact *(Rabbani et al., 2023).*

As regards the risk factor of DS, more than a third of the nursing students answered correctly that parents who

have a previous child with Down syndrome are a risk of having another child with DS. This finding indicates a gap in the understanding of genetic risk factors and recurrence patterns. This finding highlights the need to strengthen education on the hereditary aspects of Down syndrome, genetic counseling principles, and family risk assessment in nursing curricula. This finding is similar to that of a study conducted in Riyadh among nurses in primary healthcare centers, which reported that approximately 34% had a satisfactory level of knowledge regarding DS *(Shalabi et al., 2020).* These simple differences in findings may be explained by participants being health sciences university students with greater knowledge of genetic disease, which increased with study years, as evidenced in the current study.

Moreover, the current study results show that more than three-fourths of nursing students at KAU had a positive attitude and agreed that appropriate management of DS can improve the quality of life of patients with DS; this finding may be related to their health awareness. A similar study found that 85.2% of medical and health science students agreed that appropriate management of DS can improve the patient's quality of life, reflecting a positive attitude towards it *(Rabbani et al., 2023).*

Furthermore, more than two-thirds of nursing students agreed that prenatal testing helps to plan the management of the pregnancy and delivery, as it is considered a good method to figure out and be prepared for the risks and complications of the pregnancy that may affect the fetus and the mother's health *(Franjić, 2024).* Consistent with the current study, a study conducted in Al Ahsa region of Saudi Arabia found that 42% of nursing staff strongly agreed and 36.6% agreed that all pregnant women should routinely be screened for DS in their fetus *(Okpala & Okpala, 2021).* Similarly, 68.4% of medical and health science students at a UAE university agreed that prenatal testing helps to plan management of the pregnancy and delivery *(Rabbani et al., 2023).*

In addition, findings show that only two fifths of nursing students at KAU believe that children with DS will benefit from regular schooling, and near three fourths believe that people with DS can be integrated into the community; These findings indicate that while most nursing students hold inclusive views about community integration for individuals with Down syndrome, fewer recognize the potential benefits of regular schooling. The gap suggests that students may underestimate the developmental capabilities of children with Down syndrome in mainstream educational settings, despite acknowledging their broader ability to participate in community life. This highlights a need for greater emphasis on inclusive education principles within nursing training.

Conversely, a study in Rabat, Morocco, found that 82.4% of participants from parents of children with DS think that regular school is beneficial for their children, and 80% believed that it is very important for their integration into social life *(Er-Rida et al., 2024).* Adding to that, 61.6% of the participants in a study by *Rabbani et al. (2023)* of medical and health science students agreed with the statement that people with DS can be integrated into the community, which aligned with the current study finding of more than two-thirds had a positive response towards the same statement.

Notably, a study found a significant association between students' knowledge and their age and years of study. Higher knowledge was significantly more prevalent among participants ages 21 and older than among participants ages 20 and younger. Furthermore, the positive attitude was significantly higher among participants ages 21 and older than among participants ages 20 and younger. This finding is consistent with the study conducted by *Rabbani et al. (2023).* It found that years of study are a significant factor in determining knowledge of DS, and that participants' age is also a significant factor in determining their attitudes toward DS.

Additionally, the study found that the correlation coefficient between the Down syndrome knowledge and attitude scales is positive and significant, indicating that students with better knowledge of DS are more likely to have a positive attitude towards individuals with DS. Similarly, other studies measuring the knowledge and attitude of nursing students on different topics, such as dementia and epilepsy, found that there is a positive correlation between the level of knowledge and positive attitude among nursing students, which aligns with the current study findings *(Khatiwada et al., 2023; Shawahna & Jaber, 2020; Unsar et al., 2020).*

Participants aged 21 or older were 4.15 times more likely to have a positive attitude toward people with Down syndrome than those aged 20 or younger, and 2.02 times more likely to be knowledgeable than their counterparts. This finding might be related to the study level year, and they also take a psychiatric course at this level that covers this topic. Furthermore, a cross-sectional study in Hail City Community found a statistically significant association (p <0.05) between knowledge level and age *(Khalifa et al., 2022).*

To conclude, these findings highlight the positive knowledge and attitudes of nursing students at KAU regarding Down syndrome among participants, reinforce the importance of enhanced DS-related education in the nursing curriculum, and contribute to future research that could expand on factors influencing knowledge and attitude variation as this study had some limitations due to its design being cross-sectional, and being conducted at a single university through an online questionnaire, which may restrict the abilities to generalize and apply the findings to other nursing, and health sciences colleges, and may have introduced some bias, as participants could have answered questions based on perceived expectations rather than actual knowledge.

7. Conclusion

This study examined the knowledge and attitudes of nursing students at KAU regarding Down Syndrome. The study found that nursing students have a high knowledge and positive attitudes toward Down syndrome.

8. Recommendations

Given this study's findings, which revealed that nursing students at King Abdulaziz University are knowledgeable and have a positive attitude toward Down Syndrome (DS), the study proposes incorporating more in-depth educational materials on DS into the nursing curriculum. Significant gaps in understanding, such as risk factors, should be addressed as well. Moreover, to raise nursing students' knowledge, suggest developing targeted workshops that are enjoyable and educational, focusing on the management, prenatal screening, and social integration of DS content. Furthermore, based on the study's findings that younger students had less knowledge than their peers in higher years, this suggests that sophisticated foundational knowledge-building and advanced step-by-step knowledge-training systems for progressing students should be integrated into the recommended learning outcomes.

9. References

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