



(RESEARCH ARTICLE)



Down syndrome: Knowledge, perception and attitude of the nursing staffs working at the primary health care centers of Al Ahsa district of Saudi Arabia

Abdulelah Al shaikh ^{1,*}, Tayseer Fathielalim Abdelhalim Ayed ², Ibrahim Al Sultan ³, Sara Abdullah al sultan ⁴, Ameena Abdullah Alsultan ⁵, Amal Hussain Alkhamis ⁶, Ameen Abdullah Alsultan ⁷, Khaira Mohammad al khalaf ⁸ and Khadija Moh'd Alsultan ⁹

¹ General Physician, Omran PHC, Eastern Health sector, Al Ahsa, Saudi Arabia.

² Family physician specialist, Doha, Saudi Arabia.

³ Dental Assistant, Eastern Health Sector, Al Ahsa, Saudi Arabia.

⁴ Medical secretary, psychiatry Hospital, Al Ahsa, Saudi Arabia.

⁵ Staff nurse, Maternity and Child Hospital, Al Ahsa, Saudi Arabia.

⁶ Staff nurse, Omran PHC, Eastern health sector, Al Ahsa, Saudi Arabia.

⁷ Project manager in quality and output control department, Directorate of Health Affairs, Qurayyat, Saudi Arabia.

⁸ Staff nurse, Psychiatry hospital, Al Ahsa, Saudi Arabia.

⁹ Staff nurse, MCH hospital, Al Ahsa, Saudi Arabia.

International Journal of Science and Research Archive, 2024, 11(01), 1053–1063

Publication history: Received on 04 December 2023; revised on 19 January 2024; accepted on 22 January 2024

Article DOI: <https://doi.org/10.30574/ijrsra.2024.11.1.0050>

Abstract

Introduction: Down syndrome (DS), an autosomal abnormality, is considered the most common and best known chromosomal disorder affecting all countries, all races, and both sexes. DS is a leading cause of specific birth defect and the most commonly identified genetic form of mental retardation. An early structured multidisciplinary family-based care in the neuropsychological development for children with disabilities associated with DS is the need of the hour. In this multidisciplinary effort the role of para medical staffs such as nurses cannot be neglected. They play pivotal role in screening, counseling and helping the parents to cope with the children suffering from DS. Therefore a sound knowledge about DS and a positive attitude towards the children suffering from DS is necessary for them.

Material and methods: It was a cross sectional study conducted at the Primary health Care centers of Al ahsa region of Saudi Arabia All the nurses working at the MOH primary health centers of Al Ahsa region of Saudi Arabia were the study population. The study sample was calculated by applying the formula as suggested by Fisher"s and cited by Mugenda & Mugenda (1999). The calculated sample was 225 nursing staffs working at different MOH operated Primary Health care Centers. Random sampling was done from the list of nurses working at the different primary health care centers of Al Ahsa region of Saudi Arabia till the required sample size was achieved. The data were collected on the data collection sheet using a self-administered bilingual questionnaire Arabic /English (A modified validated questionnaire). The data sheet included on demographics characteristics, questions regarding assessment of knowledge (magnitude of DS, screening process for DS, signs and symptoms and consequences of DS) and questions related to attitude towards the children suffering from DS. The data were entered and analyzed by using SPSS Version 24. Frequency distribution of basic information and knowledge and attitude scores were constructed and expressed as numbers and percentages. Bivariate analysis was conducted by using a Chi-squared test to examine the association between variables and to assess the relationship between basic information and knowledge and attitude scores. A P value of < 0.05 was be considered as statistically significant.

Results and discussion: A total of 131 participants completed this survey. The mean age of the participants was 36.85 years.. The majority of the participants (58.0%) were female. Most of the participants were married (93.1%). The

*Corresponding author: Abdulelah Al shaikh

majority of the participants were diploma holders while 24.4% were graduated and 6.1% post graduate. Staff nurse constituted 85.5% of the participants while 5.3% were midwife and 9.2% head nurse. More than fifteen percent (15.3%) of the participants had their family member affected by DS. The mean knowledge regarding the Down syndrome was 4.85. Majority of the participants (59.6%) had good knowledge about the Down syndrome. The mean attitude score of the participants was 3.65. Almost sixty two percent of the participants had positive attitude towards the Down syndrome. The good knowledge about Down syndrome was significantly more among the female participants than male (59.21% vs.41.07%, $P=0.045$). Degree of good knowledge was not significantly associated with the marital status, educational level. The better percentage of good knowledge was significantly more prevalent among the head nurse as compared to the staff nurse and the midwife (66.66% vs.61.60% vs.57.14%, $P=0.034$). The female participants had significantly higher positive attitude than their male counterpart (67.10% vs, 54.54, $P=0.043$). There was no significant association of the attitude of the participants towards Down syndrome with marital status, educational qualification. The positive attitude towards the Down syndrome was more among the midwife than those of staff nurse and the head nurse (71.42% vs.62.5% vs.50%, $P=0.032$). The participants without the family history of Down syndrome had better positive attitude towards down syndrome than those with the family history of down syndrome (62.16% vs.60.0%, $P=0.521$).

Conclusion: The present study has shown that the participants lacked knowledge on the screening methods of detecting Down syndrome. The attitude of the participants towards children suffering from Down syndrome had been satisfactory. There is a need of formulating an education programme on Down syndrome to teach the nurses about the screening methods of Down syndrome among the pregnant women before the birth of the baby and among the children after the birth.

Keywords: Down syndrome; Knowledge; Perception; Attitude; Nursing staff

1 Introduction

Down syndrome (DS), an autosomal abnormality, is considered the most common and best known chromosomal disorder affecting all countries, all races, and both sexes. Affecting around 1 in 1000 live births, DS, is a leading cause of specific birth defect and the most commonly identified genetic form of mental retardation. In fact DS accounts for one-third of cases of severe learning disability. DS has been estimated to occur in approximately 1 in 732 infants in the United States [1]. According to World Health Organization (2018), DS affects around 1 in 1000 live births [2]. Wu and Morris (2013) in their study reported a prevalence of 0.66 per 1000 in England and Wales [3]. The risk of delivering babies with DS is multi-factorial and includes both genetic and environmental factors. The risk increases gradually with increasing maternal age. The risk of baby born with DS at maternal age of 20 years is only 1/ 200 birth which increases to 1/365 when the mother reaches the age of 35 years and 1/100 at maternal age of >35 years [4].

A neonate born with DS tends to be placid, rarely cry, and have hypotonia. The grown up children with DS have an IQ in the mildly -to- moderately low range and are slower to speak than other children. Down's syndrome accounts for one-third of cases of severe learning disability. The common physical characteristics consists of microcephaly, flattened bridge of the nose, slanting almond shaped eyes, shortneck, small ears, short stature and gross motor delays (evident early in life) and an increased risk of obesity [5]. About 50% of affected subjects have congenital heart disease. The involvement of musculoskeletal results in at lanto-occipital and cervical instability. Almost 60% of the patients with DS have eye problems such as congenital cataract, glaucoma, strabismus and refractive errors. Hearing loss and ear infections are very common among the DS patients [5]. The American College of Obstetricians and Gynecologists recommends screening tests (a routine part of prenatal care during first trimester) and diagnostic tests for Down syndrome to all pregnant women, regardless of age. However the suggested screening test can indicate likelihood or chances that a mother is carrying a baby with DS but the diagnostic test can identify whether the baby has DS. The screening test consists of blood test which measures the levels of pregnancy-associated plasma protein-A (PAPP-A) and the pregnancy hormone known as human chorionic gonadotropin (HCG). Abnormal levels of PAPP-A and HCG may indicate a problem with the baby. At the same time nuchal translucency screening test by ultrasound is done. The DS is suspected if more fluid than usual tends to collect in the neck tissue. The diagnostic test that can identify DDS consists of chorionic villus sampling in which cells from chorionic villus of placenta is taken to analyze fetal chromosomes. This test is typically done in the first trimester of pregnancy. Amniocentesis is another way in which amniotic fluid surrounding the fetus is withdrawn and is analyzed for fetus chromosomes. After birth the Down syndrome is confirmed by chromosomal karyotype of the newborn [6].

An early structured multidisciplinary family-based care in the neuropsychological development for children with disabilities associated with DS is the need of the hour. In this multidisciplinary effort the role of para medical staffs such as nurses cannot be neglected. They play pivotal role in screening, counseling and helping the parents to cope with the

children suffering from DS. Therefore a sound knowledge about DS and a positive attitude towards the children suffering from DS is necessary for them. Very few studies have been conducted throughout the world to assess the knowledge and attitude of health care staffs towards the children suffering from DS. Mixed results have been published in this regard. Syed Arman Rabbani et al in their study have found good knowledge among 74.0% of the future health care workers and 67% of them had positive attitude towards children with Down syndrome. Age >25 years (AOR: 4.39, 95% CI: 1.88–21.93), female gender (AOR: 1.88, 95% CI: 1.16–3.07) and single relationship status (AOR: 9.16, 95% CI: 4.19–20.01) were independent predictors of knowledge level of the participants [7]. Katrina Tyzack et al in their study have found good knowledge about the Down syndrome among the health care professionals [8]. The present study was conducted in Al Ahsa district of Saudi Arabia to evaluate the knowledge and attitude of nursing staffs towards children suffering from DS and to assess the association of their knowledge and attitude towards DS with their socio-demographic characteristics.

2 Materials and Methods

It was a cross sectional study to be conducted at the Primary health Care centers of Al ahsa region of Saudi Arabia during the month of August to September 2023. All the nurses working at the MOH primary health centers of Al Ahsa region of Saudi Arabia were the study population. The study sample was calculated by applying the formula as suggested by Fisher's and cited by Mugenda & Mugenda (1999); which is $n = \frac{z^2(p)(1-p)}{c^2}$ where z = standard normal deviation set at 95% confidence level, p = the estimated proportion of the target population was based on a previous study conducted by Syed Arman Rabbani et al (2023). c = confidence interval. (1.96). Applying this formula the calculated sample size was $1.96 \times 1.96 \times 0.26 \times 0.74 / 0.0025 = 225$ nursing staffs working at different MOH operated Ministry of Health Primary Health care Centers. According to the payroll list there are around 1000 nurses working in all the Primary Health Care Centers of Al Ahsa region of Saudi Arabia. Random sampling was done from the list of nurses working at the different primary health care centers of Al Ahsa region of Saudi Arabia till the required sample size was achieved. The data were collected on the data collection sheet using a self-administered bilingual questionnaire Arabic /English (A modified validated questionnaire) which were distributed online through Google Form. The data sheet contained three sections. The first section of the data sheet included on demographics characteristics such as - age, gender, marital status, educational qualification, position held, years of experience, participants' relative suffering from DS and whether participants attended cases of DS during their practice; the second part contained 10 questions regarding assessment of knowledge about the magnitude of DS, screening process for DS, signs and symptoms and consequences of DS while the third section had 5 questions related to attitude towards the children suffering from DS. The knowledge questions had multiple choice answers. Correct answer was awarded with 1 score while incorrect with zero score. In the knowledge section score ranged from 0 to 10, the higher the score the higher the knowledge. By using the mean as a cutoff point, the level of knowledge was measured. The participants were classified as having poor knowledge and good knowledge on the score cut off of the mean score. Above the mean score was good knowledge while the below the mean score was considered poor knowledge. Similarly the participants were classified as having negative attitude and positive attitude with a score range of 0-5. For the convenience of interpretation neutral answer was considered as disagreed and strongly agree and agreed were clubbed as agreed while strongly disagreed and disagreed were clubbed as disagreed. The data were entered and analyzed by using SPSS Version 24. Frequency distribution of basic information and knowledge and attitude scores were constructed and expressed as numbers and percentages. Bivariate analysis was conducted by using a Chi-squared test to examine the association between variables and to assess the relationship between basic information and knowledge and attitude scores. A P value of < 0.05 was considered as statistically significant. A pilot study on 10 physicians was done before starting the study to validate the reliability of the questionnaire. The pilot survey was administered giving more emphasis on internal consistency reliability and the construct validity. A reliability test (Cronbach's alpha) was utilized to measure the internal consistency of the items. The item analysis with Cronbach's alpha was carried out via SPSS for the same respondents in the pilot study to identify problematic items. A prior permission was taken from the local ethical committee and the IRB to conduct this research.

3 Results

A total of 131 participants completed this survey fully making the response rate of 58%. The mean age of the participants was 36.85 years \pm Std.Dev. 9.02 years (Range 28 -55 years). The majority of the participants (58.0%) were female. Most of the participants were married (93.1%) while only 3.8% were unmarried and 3.1% divorced. The majority of the participants were diploma holders while 24.4% were graduated and 6.1% post graduate. Staff nurse constituted 85.5% of the participants while 5.3% were midwife and 9.2% head nurse. More than fifteen percent (15.3%) of the participants had their family member affected by DS. The details of the socio demographic characteristics of the participants are shown in table 1.

Table 1 The details of the socio demographic characteristics of the participants

Variables	No.	Percentage
Age		
Mean age: 36.85 years \pm Std.Dev.9.02 years (Range 28 -55 years)		
Sex		
Male	55	42.0
Female	76	58.0
Marital status		
Unmarried	5	3.8
Married	122	93.1
Divorced	4	3.1
Educational Status		
Diploma	91	69.5
Graduate	32	24.4
Post graduate	8	6.1
Job position		
Staff nurse	112	85.5
Mid wife	7	5.3
Head nurse	12	9.2
Any family member affected by Down syndrome		
Yes	20	15.3
No	111	84.7

3.1 Responses on the knowledge questionnaires on Down syndrome

Majority of the participants (59.5%) answered that Down syndrome is the most common chromosomal condition diagnosed in Saudi Arabia while 6.1% of the participants did not agree with this and 34.1% of the participants did not know about this. On the statement that Down syndrome is the most common cause of intellectual disability globally, majority of the participants (48.9%) did not know about it while only 26.7% of them agree with this statement and 24.4% said that this statement is false. On the question of causative factor of Down syndrome, a vast majority of the participants (83.2%) agreed with the statement that it's a genetic condition caused by an extra copy of chromosome while 1.5% of the participants answered that its due to Insufficient folic acid during pregnancy and 3.1% of the participants answered that its due to Sexually transmitted infection during pregnancy. More than twelve percent (12.2%) of the participants did not know about it. When the participants' opinion on the diagnostic test during pregnancy for Down test was asked 41% of the participants correctly answered that its by chorionic villus sampling or amniocentesis for genetic testing followed by those (31.3%) who did not know about it. Twenty six percent of the participants answered that it should be done by blood test of mother for genetic testing and a minority of the participants (1.5%) were of the opinion that it should be done by test for sexually transmitted disease during pregnancy. On the question that what should be the diagnostic test for diagnosing Down syndrome in child, 38.6% of the participants did not know about this followed by those (29.0%) who answered that it should be done by Blood test for genetic testing and those (26.7%) who favored X ray of the child to detect the abnormality due to Down syndrome. Only 7.6% of the participants answered that it should be by ultrasonography of the child. As far as complication of Down syndrome is concerned 61.1% of the participants answered that Congenital heart disease is associated with Down syndrome followed by those (25.2%) who did not know about it. However 13.7% of the participants considered this statement as false. As far as the questions visual complication of the Down syndrome is concerned, 35.9% of the participants answered that Vision problems are associated with Down syndrome while 20.6% of the participants did not agree with this and majority of the participants (43.5%) did not know about this, Majority of the participants

(52.7%) did not know that the Hearing loss is associated with Down syndrome. However only 13.0% of the participants answered correctly that Hearing loss is associated with Down syndrome and 34.4% of the participants did not agree with this. On the statement that the age of the expecting mother does not impact the incidence of Down Syndrome, 28.2% of the participants answered it to be true while majority of them (55.0%) termed it as false. Almost twenty percent (19.8%) of the participants did not know about it. More than eighty percent (80.2%) of the participants answered that children with Down syndrome are at risk for other health problems while 6.9% of them did not agree with this and 13% did not know about this. The details on the responses of the questionnaires of knowledge regarding Down syndrome are shown in table 2.

Table 2 The details on the responses of the questionnaires of knowledge regarding Down syndrome

Questionnaires on the knowledge	No.	Percentage
Down syndrome is the most common chromosomal condition diagnosed in Saudi Arabia		
True	35	26.7
False	32	24.4
I don't know	64	48.9
What causes Down syndrome		
Insufficient folic acid during pregnancy	2	1.5
Sexually transmitted infection during pregnancy	4	3.1
A genetic condition caused by an extra copy of chromosome	109	83.2
I don't know	16	12.2
Down syndrome is the most common cause of intellectual disability globally		
True	35	26.7
False	32	24.4
I don't know	64	48.9
In your opinion what is the diagnostic test during pregnancy for Down test		
Chorionic villus sampling or amniocentesis for genetic testing	54	41.2
Blood test of mother for genetic testing	34	26.0
Test for sexually transmitted disease during pregnancy	2	1.5
I don't know	41	31.3
The diagnostic test for diagnosing Down syndrome in child is		
Ultrasonography of the child	10	7.6
X ray of the child to detect the abnormality due to Down syndrome	35	26.7
Blood test for genetic testing	38	29.0
I don't know	48	30.6
Congenital heart disease is associated with Down syndrome		
True	80	61.1
False	18	13.7
I don't know	33	25.2
Vision problems are associated with Down syndrome		
True	47	35.9
False	27	20.6

I don't know	57	43.5
Hearing loss is associated with Down syndrome		
True	17	13.0
False	45	34.4
I don't know	69	52.7
The age of the expecting mother does not impact the incidence of Down Syndrome		
True	33	25.2
False	72	55.0
I don't know	26	19.8
Children with Down Syndrome are at risk for other health problem		
True	105	80.2
False	9	6.9
I don't know	17	13.0

3.2 Responses on the Attitude questionnaires towards Down syndrome

As far the attitude of the participants is concerned more than seventy eight percent (78.6%) either agreed or strongly agreed that all pregnant women should routinely be screened for Down syndrome in their fetus. However 21% of them were either neutral or disagreed with this statement. Similarly on the statement that Children with Down syndrome need special school, 71% of the participants either agreed or strongly agreed while 29% of the participants were either neutral or disagreed. On the support of the offerings job to the people suffering from Down syndrome, more than eighty percent of the participants either agreed or strongly agreed while 6.7% of the participants disagreed or strongly disagreed and 12.2% were neutral on this statement. Almost seventy eight percent of the participants either agreed or strongly agreed on the statement that children suffering from Down syndrome can be integrated into the community while more than thirty one percent (31.1%) disagreed or strongly disagreed and 13.7% were neutral. More than sixty six percent of the participants (66.4%) either strongly agreed or agreed that Children with Down syndrome can be recognized by looking at her/his face while 13.7% disagreed and 19.6% were neutral on this statement. The details of the responses on the attitude questionnaires are shown in table 3.

Table 3 Details of the responses on the attitude questionnaires

Questionnaires	No.	Percentage
All pregnant women should routinely be screened for Down syndrome in their fetus		
Strongly disagree	0	0.0
Disagree	6	4.6
Neutral	22	16.8
Agree	48	36.6
Strongly agree	55	42.0
Children with Down syndrome need special school		
Strongly disagree	0	0.0
Disagree	8	6.1
Neutral	30	22.9
Agree	47	35.9
Strongly agree	46	35.1

Do you support offerings job to the people suffering Down syndrome		
Strongly disagree	2	1.5
Disagree	8	6.1
Neutral	16	12.2
Agree	54	41.2
Strongly agree	51	38.9
Children suffering from Down syndrome can be integrated into the community		
Strongly disagree	0	0.0
Disagree	11	8.4
Neutral	18	13.7
Agree	62	47.3
Strongly agree	40	30.50
Children with Down syndrome can be recognized by looking at her/his face		
Strongly disagree	0	0.0
Disagree	18	13.7
Neutral	26	19.8
Agree	49	37.4
Strongly agree	38	29.0

3.3 Knowledge score

The mean knowledge regarding the Down syndrome was $4.85 \pm \text{Std.Dev.}1.90$ (range 1-9). Majority of the participants (59.6%) had good knowledge about the Down syndrome. The details of the Knowledge score is shown in table 4.

Table 4 The knowledge score of the participants regarding the Down syndrome

Knowledge score	No.	Percentage
Mean Knowledge score :4.85 ±Std.Dev.1.90 (range 1-9).		
Good knowledge	78	59.5
Poor knowledge	53	40.5

3.4 Association of knowledge score with the socio demographic characteristics

The good knowledge about Down syndrome was significantly more among the female participants than male (59.21% vs.41.07%, $P=0.045$). Degree of good knowledge was not significantly associated with the marital status. However it was apparently good knowledge about Down syndrome was higher among the divorced as compared to married and unmarried participants (75% vs.59.83%vs.40%, $P=0.536$). Similarly the participants with diploma holder (60.43%) were having better percentage of good knowledge about Down syndrome in comparison with those with graduate degree holder(56.56%) and post graduate degree holder(55.55%),however it was not statistically significant ($P=0.903$). The better percentage of good knowledge was significantly more prevalent among the head nurse as compared to the staff nurse and the midwife (66.66% vs.61.60% vs.57.14%, $P=0.034$).The details of the association of knowledge score with the socio demographic characteristics is shown in table 5.

Table 5 The details of the association of knowledge score with the socio demographic characteristics

Variables	Good knowledge	Poor knowledge	
Gender			0.045
Male	22(41.04)	33(58.96)	
Female	45(59.21)	31(40.79)	
Marital status			0.536
Unmarried	2(40.0)	3(60.0)	
Married	73(59.83)	49(40.17)	
Divorced	3(75.0)	1(25.0)	
Educational Status			0.903
Diploma	55(60.43)	36(39.57)	
Graduate	18(56.56)	14(43.44)	
Post graduate	5(55.55)	3(44.45)	
Job position			0.405
Staff nurse	69(61.60)	43(38.4)	
Mid wife	4(57.14)	3(42.86)	
Head nurse	5(66.66)	7(33.34)	
Family history of Down syndrome			0.032
Yes	10(50.0)	10(50.0)	
No	68(61.26)	43(38.74)	

3.5 Attitude score towards the Down syndrome

The mean attitude score of the participants was $3.65 \pm \text{Std. Dev. } 1.15$ (Range 1-5). Almost sixty two percent of the participants had positive attitude towards the Down syndrome. The details of the attitude score towards Down syndrome are shown in table 6.

Table 6 The details of the attitude score towards Down syndrome

Attitude score	No.	Percentage
Mean attitude score : $3.65 \pm \text{Std. Dev. } 1.15$ (Range 1-5)		
Positive attitude	81	61.8
Negative attitude	50	38.2

3.6 Association of attitude towards the Down syndrome with the socio demographic characteristics of the participants

The female participants had significantly higher positive attitude than their male counterpart (67.10% vs, 54.54, $P=0.043$). There was no significant association of the attitude of the participants towards Down syndrome children as far as marital status is concerned. However the positive attitude towards the Down syndrome was apparently higher among the divorced participants than those of married and unmarried (75% vs.61.47% vs.60.0%, $P=0.857$). The positive attitude towards down syndrome was higher among diploma holder than those with graduate degree and post graduate degree but it was not statistically significant (62.64% vs.62.50% vs.56.25%, $P=0.947$). There was significant association between position of the participants and the positive attitude towards Down syndrome .The positive attitude towards the Down syndrome was more among the midwife than those of staff nurse and the head nurse(71.42% vs.62.5% vs.50%, $P=0.032$). The participants without the family history of Down syndrome had better positive attitude

towards down syndrome than those with the family history of down syndrome (62.16% vs.60.0%, $P= 0.521$).The details of the association of attitude towards the Down syndrome with the socio demographic characteristics of the participants is shown in table 7.

Table 7 The details of the association of attitude towards the Down syndrome with the socio demographic characteristics of the participants

Variables	Positive attitude	Negative attitude	P value
Gender			0.043
Male	30(54.54)	25(45.46)	
Female	51(67.10)	25(32.90)	
Marital status			0.857
Unmarried	3(60.0)	29(40.0)	
Married	75(61.47)	47(38.53)	
Divorced	3(75.0)	1(25.0)	
Educational Status			0.947
Diploma	57(62.64)	34(37.36)	
Graduate	19(56.25)	13(43.75)	
Post graduate	5(62.5)	3(37.5)	
Job position			0.032
Staff nurse	70(62.5)	42(37.5)	
Mid wife	5(71.42)	2(28.59)	
Head nurse	6(50.0)	6(50.0)	
Any family member affected by Down syndrome			0.521
Yes	12(60.0)	8(40.0)	
No	69(62.16)	42(37.84)	

4 Discussion

The present study was conducted to assess the knowledge and attitude of nursing staffs and paramedics towards the patients with Down syndrome. The nurses are the first line of contact with patients and their good knowledge and positive attitude is needed to disseminate the correct information regarding congenital syndrome like DS. The present study has found a moderate level of good knowledge and positive attitude among the participants. However a vast majority of the participants (73.0%) did not know that DS is the most common cause of intellectual disability globally. In a similar study conducted in UAE, the researchers have found that 74.0% of the participants had good knowledge of DS and 67.2% of them had positive attitude towards the patients suffering from DS. Unlike the present study 85% of the participants were aware of the fact that DS is the most common cause of intellectual disability globally [9]. Comparatively, good knowledge (70.0%) and favorable attitude (78.0%) towards DS was also found in one Indian study where only 30% of the participants were having poor knowledge and 22% had unfavorable attitude [10]. However in a study conducted in Jeddah city of Saudi Arabia, MuradMahmoodBinjahlan et al have reported a poor knowledge (80.29%) of DS among the participants. There was no association between the knowledge and demographics of participants except for education at the higher levels of education [11]. The present study has also found no association there was no association between the knowledge and demographics of participants except for education at the higher levels of education, the more significant association with good knowledge except gender

As far as the questionnaires on knowledge are concerned only 24% of the participants in the Indian study knew that the diagnosis of DS is done by genetic test as compared to the present study where 41% of the participants knew this fact. However 72% of the participants in this study believed that DS syndrome is a genetic condition as compared to the

present study where more than eighty percent of the participants answered that a genetic condition caused by an extra copy of chromosome. In one Nepali study the researchers have found that more than half of the pregnant women had poor knowledge of DS and 60% did not have any idea regarding its screening [12]. One study conducted in Sharjah though on pregnant women has reported good knowledge regarding the DS among 64.97% of the participants. However only 23.04% of the participants had good knowledge regarding DS screening test. Although 42.85% had right attitude towards screening test in this study [13]. In contrast to the one American study where 20% of the physicians agreed that students with DS should go to special schools, the present study has found 71% of its participants in favor of sending the children with DS to special school [14].

5 Conclusion

We did not find many studies to compare our result. However the present study has shown that the participants lacked knowledge on the screening methods of detecting Down syndrome. The attitude of the participants towards children suffering from Down syndrome had been satisfactory. There is a need of formulating an education programme on Down syndrome to teach the nurses about the screening methods of Down syndrome among the pregnant women before the birth of the baby and among the children after the birth,

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of ethical approval

The present research work does not contain any studies performed on animals/human subjects by any of the authors.

Statement of informed consent

Informed consent was obtained from all individual participants included in this study.

References

- [1] Sherman SL, Allen EG, Bean LH, Freeman SB. Epidemiology of Down syndrome. *Ment Retard Dev Disabil Res Rev.* 2007;13(3):221-7. doi: 10.1002/mrdd.20157. PMID: 17910090.
- [2] World Health Organization Regional Office for Europe (2018) Births with Down's syndrome per 100 000 live births. Available at: https://gateway.euro.who.int/en/indicators/hfa_603-7120-births-with-downs-syndrome-per-100-000-live-births/ (accessed 3 October 2019).
- [3] Wu J, Morris JK (2013) The population prevalence of Down's syndrome in England and Wales in 2011. *European Journal of Human Genetics* 21(9): 1033–1034. DOI: 10.1038/ejhg.2012.294.
- [4] Mohammed Al-Biltagi ; Epidemiology and Prevalence of Down Syndrome, *Down Syndrome Children - An Update* (2015) 1: 3. <https://doi.org/10.2174/9781681081342115010004>
- [5] Bull MJ, the Committee on Genetics. Health supervision for children with Down syndrome. *Pediatrics.* 2011;128:393-406.
- [6] American College of Obstetricians and Gynecologists Committee on Practice Bulletins—Obstetrics, Committee of Genetics, and the Society for Maternal–Fetal Medicine: Screening for fetal chromosomal, Available from <https://www.acog.org/advocacy/policy-priorities/non-invasive-prenatal-testing#:~:text=The%20American%20College%20of%20Obstetricians%20and%20Gynecologists%20%28ACOG%29%E2%80%99s,of%20maternal%20age%20and%20risk%20of%20chromosomal%20abnormality.>
- [7] Syed Arman Rabbani, Mohammed S. Mossa, Ghaya A. Al Nuaimi, and Fatema A. Al Khateri, Down syndrome: Knowledge and attitudes among future healthcare providers, *J Taibah Univ Med Sci.* 2023 Oct; 18(5): 1179–1187. . doi: 10.1016/j.jtumed.2023.03.013
- [8] Katrina Tyzack, Euan M Wallace, Down syndrome screening: What do health professionals know?, *Australian and New Zealand Journal of Obstetrics and Gynaecology* 43(3):217-21 DOI:10.1046/j.0004-8666.2003.00070.x

- [9] Azzakhamiskamel, Abo El-Enen⁰, Reem Bassiouny, Mahmoud EL-Lassy and Amel Attia Abd El Ghaffar Moustafa, Knowledge, Attitudes and Reported Practices of Mothers with Down Syndrome Children at Kafr El-Sheikh Governorate, Assiut Scientific Nursing Journal, 1469 Vol, (01) No, (33), November, 2022, Pp (144 -162)
- [10] Chaxu Ramakantbhai, Modi, Mansee Desai. Knowledge and attitude towards down syndrome among people at Ahmedabad. *Int J Health Sci Res.* 2023; 13(6):20-24. DOI: <https://doi.org/10.52403/ijhsr.20230605>
- [11] Yousef Ehab Jan, Murad Mahmood Binjahan, Abdulrahman Ghazi Alqurashi, Ghayda ghazi Alqurashi, Mohammed Ahmed Zirari et al, Assessment of Knowledge, Attitude and Practice toward Down Syndrome in Jeddah City, Saudi Arabia 2016, *The Egyptian Journal of Hospital Medicine* (Jan. 2017) Vol. 66, Page 146-151 146 Received: 19/10/2016 DOI : 10.12816/0034645 Accepted: 24/10/2016
- [12] Padma Gurung, Jeena Baniya, Sameer Malla, Down syndrome and its screening: knowledge, attitude and practice among pregnant women in Patan Hospital, Volume 9, No. 14 92022), *Journal of general practice and emergency medicine of Nepal*, DOI: <https://doi.org/10.59284/jgpeman3>
- [13] Meena Bhati Salvi Knowledge, attitude and practice of down syndrome screening among pregnant women attending clinic in Sharjah, United Arab Emirates *International Journal of Reproduction, Contraception, Obstetrics and Gynecology* Salvi MB. *Int J Reprod Contracept Obstet Gynecol.* 2020 Jul;9(7):2765-2770 www.ijrcog.o
- [14] Pace, J.E., Shin, M. and Rasmussen, S.A. (2011), Understanding physicians' attitudes toward people with Down syndrome. *Am. J. Med. Genet.*, 155: 1258-1263. <https://doi.org/10.1002/ajmg.a.34039>