

Assessment of Knowledge, Attitude and Practice of Saudi Parents towards Neonatal Jaundice (NNJ): A Cross-sectional Study

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ABSTRACT

Background: Neonatal jaundice occurs worldwide and contributes significantly to neonatal morbidity and mortality. Recently, newborns are being discharged early from hospitals, so parents have the primary responsibility for early recognition, appropriate response and seeking proper treatment. **Objectives:** To assess parents' knowledge, attitude and practice towards NNJ in different regions in Saudi Arabia. **Methods:** This is a cross-sectional study involving 4413 expectant parents during July- September 2017 had been performed. A self-administered questionnaire was created to obtain respondents information. Descriptive statistics were used to describe the answers of participants in the study. Comparing the answers to different questions within different groups was done using Pearson chi-square test. Statistical significance was set at $p < 0.01$ and analysis was performed using IBM SPSS statistics, version 23 (IBM, Armonk, NY, USA).

Results: Out of 4413 participants, females were (79.4%) while (20.6%) were males. Participants were from all regions of Saudi Arabia, with the highest percentage from central region (29.5%), most of them lived in cities (89.6%). Age group 20-30 years constituted (46.6%), and age above 50 years was 4.5% ($p < 0.01$). Most of the participants had a university level of education (76.6%). Relatives and friends were the main sources of knowledge for (52.6%) of the participants, followed by treating doctor in (29.8%). In (34%) of the participants' knowledge was gained after their child had NNJ, while in (42.1%) while their child was free of NNJ. Warning signs knowledge depended on the level of education and occupation where university graduates and health care workers were most knowledgeable and the difference was significant ($p < 0.01$). Awareness about necessity and effectiveness of treatment were dependent on older age, occupation, and place of residence ($p < 0.01$). Hospital treatment was done only by (23.4%), believing that it wasn't a serious disease in (18.1%) of participants, while (5%) believed that it needed no treatment at all.

Conclusion: Knowledge, attitude, and practice of parents in our study, depended on age, level of education, occupation, and place of residence might have contributed to the delayed appropriate management of severe hyperbilirubinemia. We recommend the engagement of health professionals in educational settings like seminars, workshops and periodical counseling sessions to provide appropriate knowledge to parents.

Keywords: Neonatal Jaundice, prevention, genetic factors.

INTRODUCTION

Neonatal jaundice (NNJ) is the yellowish discoloration of newborn's skin and sclera due to pathological hyperbilirubinemia, also often reflect as a normal physiological phenomenon. Worldwide, newborn jaundice occurs in 60% and 80% of full and preterm neonates respectively, the majority of which resolves without any treatment⁽¹⁾. However, in about 8-10% of newborns, neonatal jaundice can be severe⁽²⁾. A bilirubin level more than 85 mmol/l (5 mg/dl) manifests neonatal jaundice⁽³⁾. Physiological jaundice occurs on the 2nd and 3rd day of life⁽⁴⁾, and due to the breakdown of fetal hemoglobin and the inability of the immature hepatic metabolic pathway to adequately excrete bilirubin⁽⁵⁾. Development of pathologic jaundice has perinatal, neonatal and genetic factors as well as administration of some drugs. Increased

incidence of NNJ could also be observed in breastfed neonates receiving suboptimal milk intake resulting in inadequate fluid and nutritional intake⁽⁶⁾. In Saudi Arabia, ABO incompatibility was observed in 31.6% of neonates with indirect hyperbilirubinemia, glucose-6-phosphate dehydrogenase (G6PD) deficiency was observed in 10.5% of neonates with indirect hyperbilirubinemia, Rh incompatibility and polycythemia were found in 2.6% of neonates with indirect hyperbilirubinemia and in 0.4% of all neonates⁽⁷⁾.

NNJ contributes significantly to neonatal morbidity and mortality. Possible complications arising from unconjugated hyperbilirubinemia include acute bilirubin encephalopathy, kernicterus, seizures, cerebral palsy, mental retardation, and deafness⁽⁸⁾.

Kernicterus involves staining of basal ganglia by bilirubin and is associated with diffuse damage of neurons, serum bilirubin levels more than 20 mg/dl in normal weight, otherwise healthy infants are associated with high incidence of kernicterus⁽⁹⁾.

Kernicterus has at least 10% mortality and 70% morbidity⁽¹⁰⁾. It is incurable, but if jaundice is seized early and effective therapy started soon, kernicterus is preventable⁽¹¹⁾.

Recently, newborns begin discharge early from hospital, so parents have the primary responsibility for early detection of jaundice and seeking proper treatment at the right place. Therefore, it is important that parents should have correct knowledge of how to recognize newborn jaundice as well as how to respond appropriately, because often the delay in seeking medical advice usually due to parents' action and sometimes they do self-medication with herbal medicines and homemade remedies due to inadequate knowledge⁽¹²⁾, also misconceptions include the beneficial role of sunlight in reducing severe jaundice. Aladag *et al.* reported that out of 118 parents interviewed, 12.7% considered sunlight to be useful for neonates with jaundice⁽¹³⁾.

This study has been conducted in order to assess knowledge and attitude of Saudi parents towards recognition, causes, complications, treatment, and prevention of NNJ that may contribute to delayed presentation and inappropriate management of severe hyperbilirubinemia.

Aim: To assess parents' knowledge, attitude and practice towards Neonatal Jaundice (NNJ) in Saudi Arabia

OBJECTIVE OF THE STUDY

- Assess parent's knowledge toward newborn jaundice
- Assess parent's attitude toward newborn jaundice
- To find out whether there are any association between parents' practices and attitude with age, educational level, residential area and occupation
- To see whether there is a significant correlation in the knowledge, attitude & behavior on Neonatal Jaundice in the study population.

METHODS

This is a cross-sectional study involving 4413 expectant parents in Saudi Arabia between July-September 2017. The participants were from all regions of Saudi Arabia (north, west, central, east and south regions) and the selected age group was from 20 to above 50. The selected sample size for this study was randomly determined. A self-administered

questionnaire was developed after a careful review of the literature on the subject. The questionnaire consists of four parts:

1. Parent's demographical data, which included: gender, age, educational, employment status residential area.
2. Parent's knowledge towards NNJ; its content: definition, knowledge resources, causes and risk factors, complication, dangerous signs, treatment, affective types of phototherapy, prevention.
3. Parent's beliefs toward the effect of sunlight on treatment of NNJ
4. Parent's attitude towards NNJ in their affected child

Data Collection and statistical analysis

Survey was conducted using a self-administered structured questionnaire generated by the author, designed to obtain the respondent's information. Data were collected by six data collectors who were a medical intern by the distribution of the survey website-like through Saudi population in social media. Descriptive statistics were used to describe the answers of the participants in the study using numbers and percentages. Comparing the answers to different questions within the different groups was done using Pearson chi-square test. Statistical significance was set at $p \leq 0.01$ and analysis was performed using IBM SPSS statistics, version 23 (IBM, Armonk, NY, USA). The study was done after approval of ethical board of University of Hail. **The study was done after approval of ethical board of University of Hail.**

RESULTS

A total of (4413) Saudi Parents participated in this study. Females (79.4%) were more than males. Participants were from all regions of Saudi Arabia, with the highest percentage from central region (29.5%), most of them lived in cities (89.6%). The highest percentage of the participants are from the age group 20-30 (46.6%) and the least is from the age above 50 (4.5%). Most of the participants were with university level of education (76.6%). Regarding the occupation, (31.7%) were unemployed and lowest percentage were healthcare workers (5.5%) (Table 1). Regarding the personal history; most of the participants had 1-4 children (76.7%) while those having more than 4 children were (23.3%). Yellow discoloration of sclera or skin as well changes color of urine and stool were the main definition of NNJ stated by (90.9%) of participants. Only (9.1%) had no knowledge. In (51.1%) no history of a child with NNJ was found. As regards knowledge of NNJ (43.8%) had sufficient knowledge and (56.2%) had no knowledge at all. Source of knowledge was least from Healthcare

worker (6%) and mostly from relatives and friends followed by treating doctor (52.6% and 29.8%) respectively. In 34% of the participants, knowledge was gained after their child had NNJ, while in 42.1% their child was free of NNJ (Table 2).

In (63.2%) no previous knowledge of etiology of NNJ was noted. Blood incompatibility and prematurity were the most etiological factors (Figure 1). The knowledge for etiology of NNJ differs significantly between age groups, the percentage was highest in the 20-30 age group (39.5%) and lowest in the 41-50 age group (32%) and the difference was statistically significant at (p-value < 0.01). Also, the knowledge for etiology of NNJ differed significantly by levels of education. Participants who know about the etiology of NNJ were highest in the university education level (38.4%) and lowest in the primary education level (21.9%) and the difference was statistically significant at (p-value < 0.01). It was also different according to occupations being highest in healthcare workers (69.7%) and lowest in the unemployed group (29.8%) and the difference was statistically significant at (p-value < 0.01). The most common warning signs for necessary treatment were high fever and refusal to feed (31.3% and 26.6%) respectively (Figure 2). Knowledge about warning signs for necessary treatment differed by level of education. It was more in university level of education (57.1%) and least in Illiterate (40.0%) and the difference was statistically significant at (P-value 0.01). The attitude of participating parents regarding treating their children was mostly treating them at the hospital (23.4%), while about (18.1%) thought NNJ is not dangerous enough to be treated at the hospital (Table 3).

The effective treatment of NNJ was mostly phototherapy at the hospital (59.1%) followed by Home light (28.4%) (Figure 3). White light (62%) followed by blue light (33.3%) was the most effective type of phototherapy as stated by parents, while (65.9%) of participants mentioned that sunlight was beneficial (Table 4). Knowledge was more in the age group of 31-40 (73.2%) than other groups, and it was also more in teachers (74.2%) than parents having other occupations and the difference was statistically significant at (P value<0.01). Knowledge about effective treatment of NNJ was more in city residents NNJ than village resident (81.1% and 73.6%) respectively, and the difference was significant at (P value<0.01). Healthcare workers had more knowledge about effective treatment of NNJ than other occupations and the difference was statistically significant at (P value<0.01).

The most common complications of NNJ stated by participants were developmental delay and death (28.5% and 13.6%) respectively (Table 5). Knowledge about the complication differed by age group, younger individual (age group 20-30) had more knowledge about complication than older groups and the difference was statistically significant at (P value=0.01). Occupation also had a statistically significant effect (P value<0.01) as regards knowledge about the complications, where healthcare workers had the highest level of knowledge (66.8%).

Regarding prevention of NNJ in (37.7%) stated that prior knowledge of NNJ will prevent it followed by prenatal screening and follow up (35.2%). The best way to educate about NNJ was providing the mothers with brochures during antenatal care visits (64.2%) and awareness through social network programs (49.7%) (Table 6)

Table (1): Demographic data of the participants

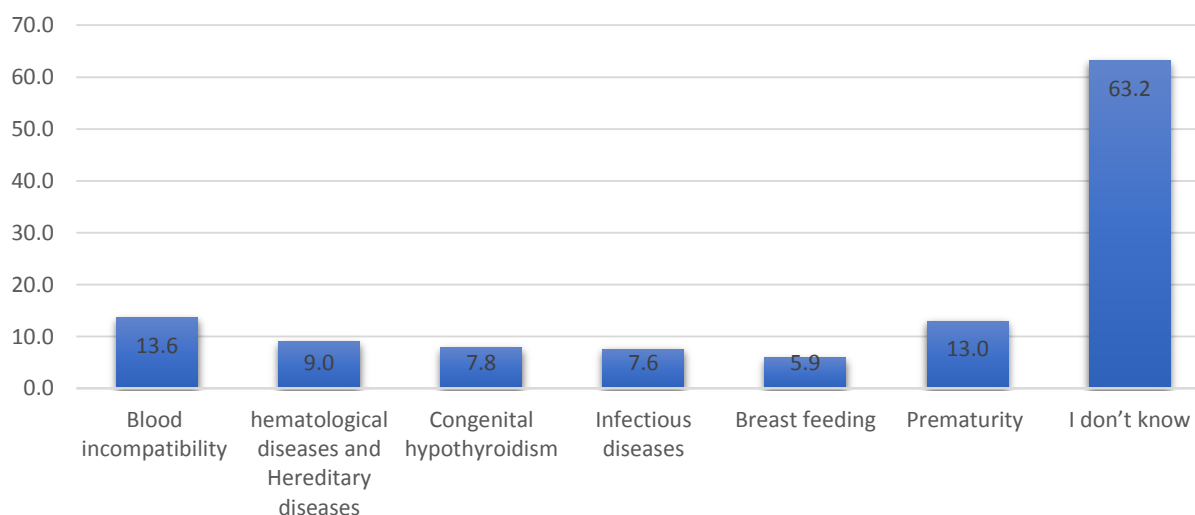
| | N0. | Percent |
|---------------------------|------|---------|
| Gender | | |
| Female | 3503 | 79.4 |
| Male | 910 | 20.6 |
| Place of residence | | |
| village | 459 | 10.4 |
| city | 3954 | 89.6 |
| Region | | |
| South | 498 | 11.3 |
| East | 458 | 10.4 |
| North | 1050 | 23.8 |
| West | 1106 | 25.1 |
| Central | 1301 | 29.5 |
| Age | | |
| 20-30 | 2055 | 46.6 |
| 31-40 | 1521 | 34.5 |
| 41-50 | 637 | 14.4 |
| > 50 | 200 | 4.5 |
| level of education | | |
| Illiterate | 30 | 0.7 |
| Primary school | 73 | 1.7 |
| Middle school | 138 | 3.1 |
| High school | 793 | 18 |
| university | 3379 | 76.6 |
| Occupation | | |
| Students | 754 | 17.1 |
| Unemployed | 1398 | 31.7 |
| teacher | 1045 | 23.7 |
| officer | 349 | 7.9 |
| Health care worker | 244 | 5.5 |
| others | 623 | 14.1 |

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Table (2): Showing some of the personal history and knowledge regarding NNJ

| | Frequency | Percent |
|--|-----------|---------|
| How many children do you have? | | |
| 1 | 1665 | 37.7 |
| 2 to 4 | 1719 | 39 |
| > 4 | 1029 | 23.3 |
| Do you have sufficient knowledge for NNJ ? | | |
| No | 2478 | 56.2 |
| Yes | 1935 | 43.8 |
| What's the definition of NNJ ? | | |
| Yellow discoloration of sclera | 3109 | 70.5 |
| Color change of urine or stool | 342 | 7.7 |
| Yellow discoloration of skin | 1765 | 40.0 |
| I don't know | 402 | 9.1 |
| Do you have any history of child with NNJ ? | | |
| One child | 1239 | 28.1 |
| Two children | 512 | 11.6 |
| >two | 409 | 9.3 |
| No | 2253 | 51.1 |
| What is the source of knowledge ? | | |
| From healthcare worker | 264 | 6.0 |
| Relatives and friends | 2321 | 52.6 |
| Social network services | 791 | 17.9 |
| I had no source of knowledge | 625 | 14.2 |
| Doctor who treat my child | 1314 | 29.8 |
| When did you get the knowledge ? | | |
| After the child had NNJ | 1499 | 34 |
| Before the child had NNJ | 760 | 17.2 |
| I have knowledge and my child didn't have NNJ | 1859 | 42.1 |

Fig.1: Percentage of etiology of NNJ



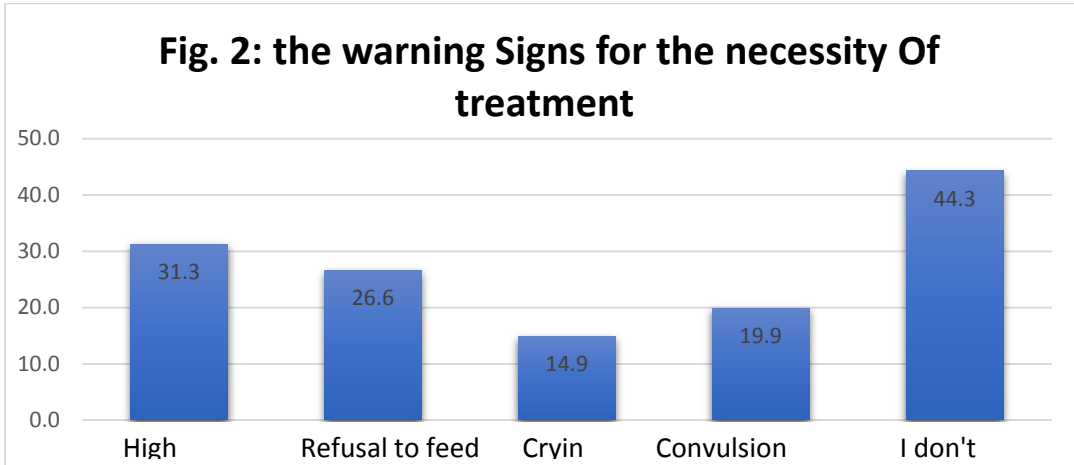


Table (3): Answers of participants regarding treating their children who had NNJ

| | Frequency | Percent |
|---|-----------|---------|
| What was your action when your child had NNJ ? | | |
| Increase breast feeding | 207 | 4.7 |
| Expose to sunlight | 602 | 13.6 |
| Expose to neon light | 71 | 1.6 |
| Expose to home light | 301 | 6.8 |
| Getting herbal medication | 196 | 4.4 |
| Treated at hospital | 1032 | 23.4 |
| Getting antibiotic | 18 | 0.4 |
| Do nothing | 418 | 9.5 |
| No answer | 1568 | 35.5 |
| If you didn't treat the child at hospital, why ? | | |
| Herbal is better | 317 | 7.2 |
| Fear from hospital | 226 | 5.1 |
| Don't want to expose the child for blood sample | 327 | 7.4 |
| Don't need treatment | 220 | 5 |
| They thought NNJ is not dangerous | 797 | 18.1 |
| No answer | 2526 | 57.2 |

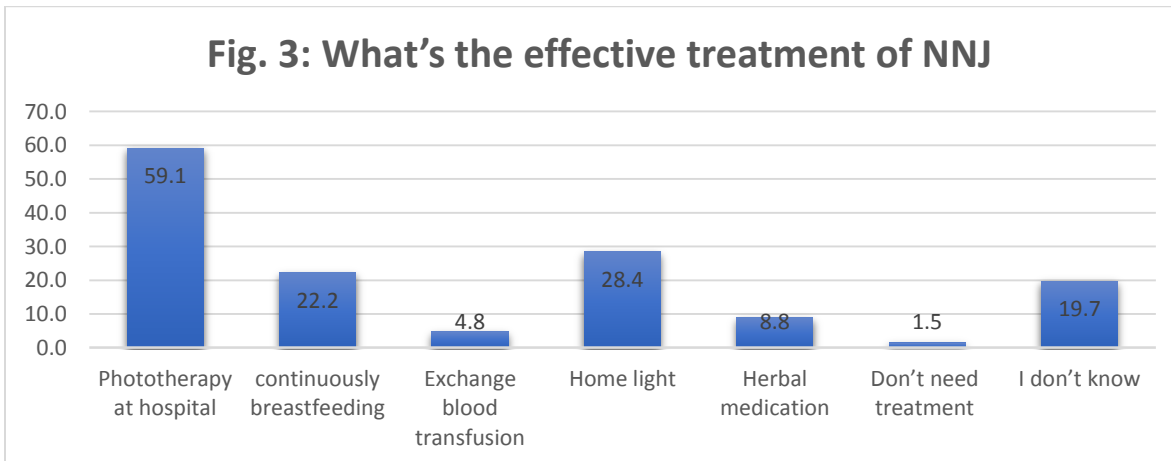


Table (4) : Answers of participants regarding the effect of light as a treatment

| | Frequency | Percent |
|---|-----------|---------|
| 17) What's the effective type of phototherapy ? | | |
| White | 2738 | 62 |
| Green | 207 | 4.7 |
| Blue | 1468 | 33.3 |
| 18) what's the effect of sunlight on treatment of NNJ ? | | |
| I don't know | 1032 | 23.4 |
| Neither beneficial nor harmful | 308 | 7 |
| Harmful | 167 | 3.8 |
| Beneficial | 2906 | 65.9 |

Table (5): Questionnaire about complications of NNJ

| | Frequency | Percent |
|--|-----------|---------|
| 14) Do you think NNJ has complications? | | |
| no | 2088 | 47.3 |
| yes | 2325 | 52.7 |
| If yes, what are the complications? | | |
| Developmental delay | 1257 | 28.5 |
| Seizure | 306 | 6.9 |
| Blindness and deafness | 307 | 7.0 |
| Physical disability | 411 | 9.3 |
| Death | 598 | 13.6 |
| No answer | 1959 | 44.4 |

Table (6): Answers of participants regarding prevention and education of NNJ

| | Frequency | Percent |
|--|-----------|---------|
| How to prevent NNJ ? | | |
| Prenatal screening and follow up | 1555 | 35.2 |
| Prevent Infections | 366 | 8.3 |
| Healthy diet during pregnancy | 1256 | 28.5 |
| Prior knowledge of NNJ | 1663 | 37.7 |
| I don't know | 1072 | 24.3 |
| What is the best way to educate and stimulate awareness of people about NNJ ? | | |
| Create NNJ awareness camping in public area | 1069 | 24.2 |
| Through social networking programs | 2193 | 49.7 |
| Provide brochures to the mother during antenatal care visits | 2833 | 64.2 |

DISCUSSION

The questionnaire used in this research about knowledge, attitude, and practice of Saudi parents toward NNJ is, to the best of our knowledge, the first to be conducted in Saudi Arabia.

The delay in seeking medical advice for NNJ can lead to severe hyperbilirubinemia and this may contribute significantly to neonatal morbidity and mortality¹¹. Therefore, in order to have an effective management of NNJ, parents must have adequate knowledge, perception and early care seeking

behavior. Many similar studies were conducted, but our study was the only one to include both parents with the biggest number of participants (4413). Also, our study was comprehensive to cover many parts such as definition, etiology, warning signs for the necessity of treatment, effective type of treatment, complications, and prevention. We also asked specific questions about the source of knowledge, effective type of phototherapy, sunlight benefit for the treatment of NNJ, history of an affected child with NNJ and parents' attitude toward their affected child, and

finally we asked about the best way to educate and raise awareness of people toward NNJ.

In our study, a total of (4413) participates, females were more than males (79.4%). Most of them live in the city (89.6%), and highest percentage were from central region (29.5%). Most of the age group were between 20-30 of years old (46.6%) and their level of education was mostly university level (76.6%). Regarding the occupation, (31.7%) were unemployed and the minority were healthcare workers 5.5%. The main definition of NNJ stated by participants was Yellow discoloration of sclera or skin as well as change color of urine and stool (90.9%). In (51.1%) there was no history of NNJ in their children. As regards knowledge of NNJ (43.8%) had sufficient knowledge and their source of knowledge was mostly from relatives and friends (52.6%), in 34% the knowledge was gained after their child had NNJ. Blood incompatibility (13.6%) and prematurity (13%) was the most etiological factors for NNJ. Most common warning signs for the necessity of treatment were high fever and refusal to feed (31.3% and 26.6%) respectively. The effective treatment of NNJ as stated by parents was mostly phototherapy at the hospital (59.1%), while (28.4%) chose home light. White light (62%) followed by Blue light (33.3%) were the most effective type of phototherapy as stated by parents, and (65.9%) of participants believed that sunlight was a beneficial treatment for NNJ. The most common complications of NNJ as stated by participants were a developmental delay (28.5%) and death (13.6%). Parents' attitude toward their children who had NNJ was mostly treating them at the hospital (23.4%), while about (18.1%) thought NNJ is not dangerous enough to be treated at the hospital. The best way to educate about NNJ was providing mothers with brochures during antenatal care visits (64.2%)

This study provides an association between parents' sociodemographic factors and their knowledge and attitudes related to NNJ in Saudi Arabia. We found that Saudi parents had average knowledge of NNJ and only (23.4%) of them sought medical treatment at the hospital, while others sought different treatments; mostly exposure to sunlight (13.6%) and (9.5%) did nothing. We also found that their knowledge of its etiology was highest in the 20-30 age group and highest in the university education level, but it was lowest in the unemployed group. Group of university education level was the most group having knowledge about warning signs for the necessity of treatment of NNJ and its complications, but they were the least group to have knowledge about

the effective treatment of NNJ. As regard occupations, the healthcare workers had the highest knowledge regarding effective treatment of NNJ and its complications, also those who were in city residential area had more knowledge about effective treatment of NNJ than village residents. Believing in the beneficial value of sunlight to treat NNJ was more in the age group of 31-40 (73.2%) than other groups, and was also more in teachers (74.2%) than other occupations.

In previous studies, 53% of participants had identified phototherapy as the standard management of NNJ. Many of them still considered home remedies and sunlight exposure as initial treatment options. Similar practices are observed in studies from underdeveloped countries in Asia and Africa⁽¹⁴⁾.

Moawad *et al.*⁽¹⁴⁾ studied the perceptions, practices, and traditional beliefs related to neonatal jaundice among Egyptian mothers. In this study a total of 400 mothers participated and revealed moderate knowledge and attitude scores of Egyptian mothers in most domains with a mean of 6.6 and 20.6, respectively, although the majority of them were illiterate or had low educational attainment and lived in rural areas (89.5%). Around 75 had a past history of their infants developing NNJ (18.8%). In terms of knowledge, 52.3% of participants had adequate knowledge about NNJ in the aspects of awareness, risk factors, management, and complications. Almost all participants exhibited moderate (89.8%) and high levels (10%) of positive attitudes toward NNJ. Working mothers and those residing in urban areas were significantly more knowledgeable and attained higher attitude scores than housewives and rural ones. They reached a conclusion that majority of Egyptian mothers have a satisfactory level of knowledge and attitudes related to NNJ. However, cultural beliefs and traditional infant care practices still have an impact on mothers regardless of their educational level. Another study of knowledge, attitude, and practice among expectant mothers attending antenatal clinic in Nigeria about neonatal jaundice and its management, **Egube *et al.***⁽¹¹⁾, found that expectant mothers attending antenatal clinic at University of Benin Teaching Hospital (UBTH) had good knowledge of the treatment and complications of NNJ but inadequate knowledge of the causes and danger signs of the condition. 85.9% were aware of the condition, 77.4% knew how to recognize the symptoms of NNJ, and 71.7% knew a correct method of treatment of NNJ. A substantial proportion of the expectant mothers (67%) knew some complications of NNJ while 52.7% did not know any danger sign of complications of NNJ.

Malaysian mothers' knowledge & practices on care of neonatal jaundice is studied by **Boo**⁽¹⁵⁾ who aimed to determine the gaps of knowledge and practices of care of neonatal jaundice among Malaysian mothers. The results showed that a majority (93.8%) of them knew about neonatal jaundice. A very low proportion (27.1%) of them was aware that putting jaundiced infants under the direct sun could result in dehydration and worsening of jaundice.

Some other studies showed more deficient maternal knowledge about the NNJ as in a study conducted in Turkey by **Sumer**⁽¹⁶⁾ regarding the evaluation of maternal knowledge level about neonatal jaundice. They concluded that the mothers' knowledge about neonatal jaundice is insufficient. Maternal education level and having a previous offspring with jaundice are major factors affecting the knowledge of the mothers on hyperbilirubinemia.

The education and knowledge are not sufficient by themselves to change the behavior. Thus, more studies are needed to investigate the influences on health-seeking behaviors in Saudi Arabia.

The health care provider can influence mothers' attitudes and practices related to NNJ. Several previous studies have demonstrated significant improvement of maternal knowledge and behavior concerning neonatal care following antenatal visits⁽¹⁷⁾.

CONCLUSION

Knowledge of Saudi parents about NNJ was average; however, some of the attitude and practice of these parents, depending on age, level of education, occupation, and place of residence, might have contributed to the delayed appropriate management of severe hyperbilirubinemia. We recommend the engagement of health professionals in educational settings like seminars, workshops and periodical counseling sessions to provide appropriate knowledge to parents regarding Neonatal Jaundice.

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