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Knowledge and Attitudes of Mothers on Neonatal Jaundice in Saravan, Iran

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The objective of the study was to assess the knowledge and attitudes of mothers in Saravan, Iran on neonatal jaundice, whether or not herbal remedies were being used, and if these herbal remedies were harming the neonates. 59 participants answered questions from a questionnaire delivered orally and answers were recorded and entered into a spreadsheet for analysis. 72.88% of the neonates of the mothers questioned had neonatal jaundice within the first 28 days of birth. 58.67% of mothers knew that neonatal jaundice was a "sign of serious illness" and "could damage the brain." 97.73% of neonates with jaundice within the first 28 days survived and 97.67% of the surviving babies had no abnormalities. 77.5% of mothers had given their neonate with jaundice "antibiotics," "remedies," or "herbs." We concluded that the rates of jaundice among neonates were abnormally high in this region and that the mothers' knowledge on the significance of the illness was appropriate. Although most of the mothers were giving their neonates herbal remedies, these remedies did not seem to be harming the neonates. Further research will be done to determine correlations and further conclusions.

Keywords and Phrases: neonatal, jaundice, Saravan, Iran, bilirubin, herbal, remedies

Table of Contents

List of Tables

Introduction

Neonatal jaundice is a serious condition that may result in fatal complications if not treated properly and in a timely manner. This condition is caused by an excess of bilirubin in the blood, a yellow substance created from the degradation of red blood cells. Bilirubin is broken down by the liver in a healthy adult by binding to albumin and being excreted as bile. Neonates in the first few days after birth produce 6 to 8 mg/kg per day, more than twice as much as adults, due to an increased red blood cell turnover rate. Bilirubin production usually declines 10 to 14 days after birth.[1] For this reason, the risk of jaundice and complications resulting from the hyperbilirubinemia is highest in the few days directly following birth.

There are a few different types of jaundice. Physiological jaundice typically follows a pattern, with bilirubin levels peaking three to four days after birth and slowly decreasing over the first week. Jaundice can also be caused by breastfeeding, with early and late onsets. The causes of breastfeeding jaundice are not well-understood, but may possibly be due to certain proteins and factors in the mother's milk that slow down the conjugation of the bilirubin. Pathologic jaundice is classified as anything other than physiologic or breastfeeding jaundice. It is most likely due to underlying causes such as sepsis, rubella, or toxoplasmosis. Jaundice becomes a serious concern once it reaches the brain. One of the most severe complications associated with this increased level of bilirubin is "kernicterus", which involves the deposition of unconjugated bilirubin in the brain tissue.[2] The exact role of bilirubin in this condition is not completely known; however, it is

believed that if the level of bilirubin exceeds the binding capacity of the albumin protein, the unconjugated bilirubin can cross the blood-brain barrier and deposit into the brain tissue. This level of toxicity becomes a concern when bilirubin levels exceed 25 mg/dL in a healthy infant, and 20 mg/dL in an infant with hemolysis.[1] The effects of kernicterus can be subtle, but may occur in as little as three days after birth. Typical treatment of jaundice involves phototherapy, which sends wavelengths of blue light to convert the bilirubin into photoisomers that can pass through the bile without needing to be conjugated with albumin. This phototherapy is usually extensive and quite effective, significantly reducing the amount of bilirubin present in the blood until the red blood cell production slows down.[3,4]

The rate of complications associated with neonatal jaundice are relatively low in countries such as the United States that have access to advanced technology and equipment. Most hospitals in the US have ready access to phototherapy for the few babies that develop jaundice during their time in the hospital and complications associated with jaundice are quite rare, due to this ease of access. However, rates of complications are higher in countries and areas that do not have as much access to advanced medical equipment. Neonates may be sent home with their mothers earlier than the time of onset of jaundice, which would drastically reduce access to treatments. Jaundice may be viewed as a normal finding, especially in regions that it commonly occurs, and this may delay treatment as well. Even if the mothers are aware that jaundice could become serious and need urgent treatment, their hospitals may not have access to the phototherapy treatments.

Literature Review

Research on neonatal jaundice in Kano, Nigeria aimed to identify knowledge, attitude, and practice of household caregivers related to neonates with jaundice. Researchers in the Nigerian study found that most of the caregivers did not look for or observe jaundice in their neonates, but that they would seek care at a hospital for the disease. There was a significant relationship between education and what mothers and caregivers would do if their neonate developed jaundice. There were also differences among ethnic groups. The Nigerian study was significant because it drew attention to rural populations that may not have access to education about jaundice. Based on these results, other rural areas may show similar patterns in knowledge and attitudes, and interventions may be necessary to increase public knowledge about the disease. Dr. Ida Slusher, the faculty mentor for the study in this paper was involved in the Nigerian study, which is in the process of publication. The study in this paper on a rural area in Iran was a replica study from the Nigerian study.

Studies done in Iran have found that the use of herbal or traditional remedies may lead to a delay in proper diagnosis and treatment. A study was done by Boskabadi and Mafinejad (2011)[5] on three different herbs, which were found to be the most used herbal remedies by mothers and midwives. Boskabadi and Mafinejad (2011) found that infants given these remedies were found to have a higher incidence of complications due to hyperbilirubinemia. Researchers also found that the complications were more serious due to a delay in taking the neonates to the hospital. This delay was caused by the belief that the herbal remedies should be improving the jaundice, when in fact the effects can be harmful. In a different article by Amiri, Joharchi, and Taghavizadeh (2014)[6], the effects of thirty-seven different plants on neonatal jaundice were discussed. Amiri, Joharchi, and Taghavizadeh (2014) found that most of the plants were

effective, and not widely used in any other place in the world but Mashhad, Iran. The researchers discuss that these herbal remedies could be just as effective as the high-tech equipment in the larger, more urban cities around the world that may not be interested in looking into traditional remedies. The two studies by Boskabadi (2011) and Amiri (2014) are contradicting, which creates interest in this area and may lead to more research on herbal remedies.

Many of the articles on neonatal jaundice from Iran discuss the underlying reasons for the high prevalence of jaundice and the technologies used for treatment. However, even the articles that discuss etiologies of neonatal jaundice and technologies discuss the importance of knowledge and education on preventing complications due to jaundice. An article by Dehghani and Efazati (2015) investigating the causes of cholestasis in neonates with hyperbilirubinemia talks about the importance of educating families and care centers on the effects of jaundice, its seriousness, and complications that may arise due to the illness. It mentions that a delay in diagnosis is one of the biggest issues and a well-known reason for complications.[7] Another article by Hemmati and Inaloo (2013)[8] presented a lot of background information on the causes of jaundice in neonates in Iran and was a good example of many of the studies done in Iran on finding out the cause of neonatal jaundice. Hemmati and Inaloo (2013) were primarily testing many different factors that may cause or have an effect on the newborns in contracting jaundice. Hemmati and Inaloo (2013) found that the most common causes of the jaundice, which they referred to as severe hyperbilirubinemia were blood group incompatibility, G6PD deficiency, and sepsis. Hemmati and Inaloo (2013) also found that most of the neonates with severe hyperbilirubinemia were male, had previously-born siblings with the condition, were discharged from the hospital early, were born through normal vaginal delivery, were breastfed, or their mothers came from a similar ethnic background, which were listed as risk factors. Hemmati and

Inaloo (2013) also surveyed the mothers on ethnic and cultural background and education level and found that ethnic background had more of an effect than education level on preventing severe hyperbilirubinemia complications. This was an interesting finding and was similar to the Nigeria study in that ethnicity had an effect on knowledge and attitudes.

One factor that could increase the risk of jaundice is a G6PD deficiency, or glucose-6-phosphate dehydrogenase deficiency, which is common in those from Africa and the Middle East. An article by Abolghasemi and Mehrani (2004)[9] discussed the prevalence and effects of G6PD deficiency in neonates in a large city in Iran. Abolghasemi and Mehrani (2004) tested the cord blood of 2000 male and female neonates with quantitative and qualitative red blood cell G6PD assays for the deficiency. The researchers found that 2.1% of the babies had this deficiency, 3.6% of the males and 0.6% of the females had this deficiency. Out of the 2000 that were tested, 177 had severe jaundice and hyperbilirubinemia, 17 of them had G6PD deficiency and 160 of them did not. Abolghasemi and Mehrani (2004) also found that the levels of bilirubin were higher in the G6PD deficient neonates. The researchers concluded that a prevalence rate of 2.1% was relatively high and that rates of jaundice are three times as high among those neonates with a G6PD deficiency. Abolghasemi and Mehrani (2004) also concluded that this emphasized a need for screening for this deficiency as there is a much higher chance that they will develop jaundice; they must be monitored closely and may need to be treated quickly. Articles and studies like these are common due to all the research being done to find out the underlying causes of such a high prevalence of neonatal jaundice in Iran. A similar article by Ahmadi and Ghazizadeh (2008)[10] investigated the same idea expressed in the previous article, but includes other potential causes as well. The study by Ahmadi and Ghazizadeh (2008) also differs in location; newborns tested in this study were born in the north

of Iran, in the Mazandaran province, a much different climate and area as well as differing ethnicities than the city in the previous study by Abolghasemi and Mehrani (2004). In this study by Ahmadi and Ghazizadeh (2008), they tested 1018 neonates and performed a similar diagnostic test. The researchers then analyzed the data to find the prevalence of sepsis, APO compatibility, G6PD deficiency, or an undetermined cause. Ahmadi and Ghazizadeh (2008) found that the prevalence of sepsis as a cause was 2.7%, ABO incompatibility was 2.9%, G6PD deficiency was 13.6%, and undetermined causes was 80.1%. With this study, we see that the neonates in this area had a six times higher rate of prevalence of G6PD. Perhaps the higher rate of prevalence of G6PD was due to the fact that newborns in this area of Iran may be of a different ethnicity than those in central Iran. Both of these studies[9,10] as a whole tell us that the rate of prevalence of G6PD deficiency in Iran is high in general, but that it may be different according to the specific area. Neonates in this part of Iran must be screened for this disorder and even more closely monitored for jaundice, hyperbilirubinemia, and eventual treatment.

Another genetic cause that has been investigated in an article by Dastgerdy (2012) is a mutation in the UGT1A1 gene, and race has been hypothesized to play a role in this mutation. It is believed that the mutation is responsible for a structural change in an enzyme that causes a reduction of function in the enzyme. Out of the 26 neonates with hyperbilirubinemia, 4.3% were homozygous for the mutation, 26.1% were heterozygous, and 69.6% had no mutation. Dastgerdy (2012) also used a control group of 53 neonates without hyperbilirubinemia and found that 21.3% had the mutation, with 4.3% of them homozygous and 17% heterozygous[11]. Dastgerdy (2012) concluded that since the prevalence rates of homozygous for mutation were the same between the two groups, that this gene does not play a significant role in the development of hyperbilirubinemia. Dastgerdy (2012) also concluded that more studies were

necessary to test all types of mutations on the gene and also the other possible effects of the mutation.

The article most related to the study in this paper was written by Khalesi (2008)[12] on the knowledge, attitude and behavior of mothers on neonatal jaundice. The study used 400 mothers in a hospital in a relatively large area. Khalesi (2008) found that although the mothers had overall significant knowledge about diagnostic methods, they did not know much about the causes, complications, harmful symptoms, and prevention of the disease. The mothers' knowledge of the disease was found to have a direct correlation with the mother education level and age. Khalesi (2008) gave background information about neonatal jaundice and discusses the complications that can arise from late detection and treatment. Khalesi (2008) then emphasized the importance of the mothers' knowledge of the disease in preventing complications. Khalesi (2008) then talked about the results which include the level of knowledge mothers had about the condition and the percentage of each. In the discussion, Khalesi (2008) stated that the mothers' level of knowledge was not as high as it should be, although about half had the right attitude about the condition and knew that it was curable if it was treated quickly. At the end Khalesi (2008) mentions that this study brings to attention the need for educational programs to increase awareness of this issue. The study by Khalesi (2008) is nearly identical to the one in this paper in intent and model. The biggest difference would be the location. The study by Khalesi (2008) was done in a large city, with mothers that have a higher education level than those in rural areas. Ethnicity has also been shown to be a large factor in the effects of neonatal jaundice and ethnicity would be different based on location. Larger cities would be expected to have a lower incidence of complications associated with neonatal jaundice due to the easier access to the technology and equipment present in most developed countries. However, rural areas may have

less access to these technologies as well as a decreased level of education. Home births are also common in these areas, as well as herbal remedies due to the more traditional cultures and mindsets. All of these factors may lead to a delay in diagnosis of jaundice which would delay treatment of the disease.

The literature research and review shows that there is a paucity of research on the knowledge and treatment of neonatal jaundice by mothers in rural areas of Iran. In order to truly understand neonatal jaundice in Iran, sufficient research must be done in all types of areas, urban and rural. The study in this paper aims to increase the knowledge and information on this topic of neonatal jaundice in a rural area of Iran.

Background

The rural area chosen for this study was Saravan, Iran. It is one of the counties located in the Sistan and Baluchestan Province in the Southeast of Iran, one of the 31 provinces of the country. The population is mostly Baluch, with a small portion of Sistani Persians. According to Dr. Farshad Sadeghi, the Iranian physician involved in this study, this province is one of the most underdeveloped, desolate, and poorest of Iran's provinces. The Iranian government has tried to improve the situation by establishing free-trade zones to improve employment and conditions, but it still remains one of the country's poorest areas. Rural areas similar to Saravan all around the world are particularly susceptible to the dangers of neonatal jaundice due to the lack of education and knowledge they may have of the disease. As the research shows, herbal medicines are not uncommon and may result in a delay of proper treatment, such as phototherapy. It is important to investigate these areas that see a prevalence of neonatal jaundice and ensure that mothers and caretakers are aware of the effects of the disease and its proper treatments.

Methods

The first step in this study was to obtain IRB approval for the research, which involved several components. CITI training and certification from all researchers that would have access to the data was required. Since the data collection would be in Iran and the principal researcher would not be present, a second researcher, Dr. Farshad Sadeghi was chosen for the role of data collector. Permission from Iran was also necessary since the research was being done there. Permission was obtained from the director of the clinic from which the subjects were being questioned. The questionnaire used in the study was adapted from the questionnaire used in the Nigeria study in order to fit this study in particular. A cover letter was also written to inform the participants of the study that their participation was voluntary and that they could choose to back out at any time. All of the documentation obtained needed to be translated from Farsi to English, in the case of the permission, or English to Farsi, in the case of the cover letter and questionnaire. The study fit the requirements for exemption, since we were not using vulnerable populations, i.e., children under 18 or prisoners. Once all of this documentation was received and properly translated, along with the exemption application, the file was sent in for IRB approval and approval was obtained a couple weeks later. After notification of approval was received, Dr. Farshad Sadeghi began data collection. Dr. Sadeghi read the cover letter and questionnaire to the participants, marked the answers onto the questionnaires, and scanned and emailed the questionnaires. The scanned and emailed questionnaires were in Farsi, so they needed to be copied onto the English questionnaires. From these, data was entered into Excel and sent for analysis.

Results

The total number of participants was 59. The mean age was 29 and they were 98.55% of the Baluch ethnicity and 3.45% of the Fars ethnicity. The average number of years of education past the first grade was 9.32. 83.05% of the mothers were housewives, 10.17% were teachers, and 6.78% had a different occupation. Of the question that were asked, one of the first and most important was, what do you know about yellowish discoloration of a newborn baby's skin or eyes? Responses "sign of serious illness" and "can damage the brain" were highest at 34.67% and 24%, respectively. 21.33% said that it was a "sign of illness", 16% said that it was a "normal finding", and 4% answered "other." Another key question asked was, "How long should you wait before seeking help or going to the hospital if your baby has yellowish skin or eyes?" These answers varied widely; 30.5% answered "24 hours or less", the second highest answer was "other," at 28.81%, 18.64% said "more than two days", 16.95% said "6 hours or less", 1.69% said "12 hours or less", and 3.39% answer "other." A third question asked was essentially asking the mothers if their babies had jaundice, "Did any of your children have yellow discoloration of the skin or eyes within the first 28 days of birth?" 72.88% answered "yes" and 27.12% answered "no". The next questions inquires about the severity of the jaundice, "If any of your children had yellowish discoloration of the skin or eyes, did your baby live?" 97.73% answered "yes" and 2.27% answered "no." The next question inquires even further about the severity of the jaundice, "If the baby lived, did they have any abnormalities?" 2.33% answered "yes" and 97.67% answered "no." The last question was asked after asking if the mothers gave their babies medicine and one of the most important ones of the study, "What medications did you give your baby to treat the jaundice?" 77.5% of the mothers answered that they had given their babies

some sort of "antibiotics," "remedies," or "herbs." 20.41% answered "other," and 2.04% answered "don't know."

Table 1. What do you know about yellowish discoloration of a newborn baby's skin or eyes?

Response	**%**
Normal finding	16
Sign of illness	21.33
Sign of serious illness	34.67
Can damage the brain	24
Other	4

Table 2. How long should you wait before seeking help or going to the hospital if your baby has yellowish skin or eyes?

Response	**%**
6 hrs. or less	16.95
12 hrs. or less	1.69
24 hrs. or less	30.5
More than 2 days	18.64
Other	28.81
Don't know	3.39

Table 3. Did any of your children have yellow discoloration of the skin or eyes within the first 28 days of birth?

Response	**%**
Yes	72.88
No	27.12

Table 4. If any of your children had yellowish discoloration of the skin or eyes, did your baby live?

Response	**%**
Yes	97.73
No	2.27

Table 5. If the baby lived, did they have any abnormalities?

Response	**%**
Yes	2.33
No	97.67

Table 6. What medications did you give your baby to treat the jaundice?

Response	**%**
Antibiotics/remedies/herbs	77.55
Other	20.41
Don’t know	2.04

Discussion

The results obtained from the data analysis for this study thus far were significant for many reasons. One of the first reasons was that the percentage of babies with jaundice within the first 28 days of birth was very high. In the United States, there is about a 50% rate of jaundice, which is about 20% less than the rate found in this study. The next significant finding was that although most of the mothers had a newborn with jaundice, these babies were also surviving with little abnormalities. Even more significant, most of the mothers that had a baby with jaundice had also given them some sort of herbal remedy. This leads to the conclusion that, although we do not know if the herbal remedies are benefiting the newborns, the herbal remedies are also not necessarily harming the newborns.

There are many limitations in this study currently. We did not ask the mothers about the current age of their children. The mothers may have just had a child, but for the questions referring to jaundice, they may have been referencing a much older child. In this case, we could conclude that the herbal remedy did not harm the infant. However, if the mother was referencing the child that was just born, this does not give much time to determine if the baby has

abnormalities, perhaps as a result of the herbal remedies. In a future study, we would include a question about the current age of the baby that had jaundice as a newborn in order to determine if the child was old enough to display signs of abnormalities due to the jaundice. Other limitations were the fact that the principle researcher was not present for the questioning of the participants, and that a language barrier may have been present between the researcher and the participants due to a difference in dialect. This study is ongoing and the data collected has not yet been fully analyzed. More descriptive data, as well as correlational data, will be needed to make further conclusions and determine limitations.

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