

## **Original Research Article**

### **Neonatal Jaundice: Knowledge, Attitude and Practice among Pregnant Women attending the Antenatal Clinic of Rivers State University Teaching Hospital, Nigeria**

**Aim:** This study was undertaken to assess the knowledge, attitude and practice towards neonatal jaundice among pregnant women.

**Study Design:** A cross-sectional questionnaire-based study.

**Place and Duration of Study:** The study was carried out in the antenatal clinic of the Rivers State University Teaching Hospital from 1<sup>st</sup> March to 30<sup>th</sup> June 2021.

**Results:** Majority of the pregnant women were within the age group 29-33years 58(38.9%), resided in urban areas 117(78.5%) and from South-south geo-political zone 91(61.1%). They were mostly multiparous women 65(43.6%) with tertiary level of education 100(67.1%). More than half 82(55.0%) of the women had heard of neonatal jaundice. Majority 131(89.3%) did not know the causes of neonatal jaundice, did not know the area of the body jaundice appeared first 143(96.0%), did not know the complications of neonatal jaundice 106(71.1%), did not know danger signs of neonatal jaundice 141(94.6%) and none knew any preventive method. Majority of the women 132(88.6%) would visit the hospital if their babies developed jaundice and 131(87.9%) would consent to blood transfusion if the need arose. Only 25(16.8%) women had had child(ren) with neonatal jaundice, of which 20(80.0%) took child(ren) to the hospital and 12(60.0%) presented to the hospital within 24hours. Only 1(0.7%) woman had good knowledge level, 120(80.5%) had good attitude and 12(8.1%) had good practice levels towards neonatal jaundice. There was statistically significant association between knowledge level and attitude (P value=.003) and practice levels (P value=.001).

**Conclusion:** Pregnant women attending the antenatal clinic of Rivers State University Teaching Hospital had poor knowledge and practice but good attitude towards neonatal jaundice. Emphasis should therefore be placed on health education especially during antenatal period on prevailing health issues including neonatal jaundice as this would improve their knowledge level as well as their attitude and practice.

**Keywords:** Neonatal Jaundice; Knowledge; Attitude; Practice; Pregnant Women

#### **INTRODUCTION**

Neonatal jaundice (NNJ) or hyperbilirubinaemia is the yellowish colouration of the sclera, skin or mucous membranes of the neonate due to the accumulation of bilirubin in the blood [1,2]. It is a common phenomenon, with an incidence rate of 60% - 80% reported, the lower incidence occurring in term babies and the higher incidence in preterm babies [1,2,3]. About 75% of neonatal admissions have been attributed to NNJ [2,4] as well as readmissions after discharge from birth hospitalizations [5,6]. The Nigerian Society of Neonatal Medicine (NISONM) also estimated that hyperbilirubinaemia accounted for 1 out of 5 neonatal admissions and at least 5% of all neonatal mortalities in Nigeria [5]. A previous study carried out in our centre also showed a high prevalence of NNJ of 34% [7].

Bilirubin is the product of the breakdown of red blood cells. These are frequently broken down as a physiologic response. Jaundice becomes visible in the neonate when the total serum bilirubin level reaches more than/or equal to 85  $\mu\text{mol/l}$  [8]. Hyperbilirubinaemia thus occurs due to the massive breakdown of red blood cells, immaturity of the liver, reduced bilirubin excretion from the liver and increased absorption/circulation of bilirubin from the

**Comment [EM1]:** Be consistence... use the word pregnant women and not just women

intestine. It may be conjugated or unconjugated, the latter being the most encountered [9] and may be physiologic or pathologic depending on the aetiology. Some of the risk factors of NNJ are sepsis, prematurity, maternal diabetes mellitus, race, drugs, cephalhaematoma, breastfeeding, blood group incompatibilities between the baby and mother, enzyme deficiencies such as G6PD deficiency, male sex, induction of labour with oxytocin etc [2,4,8]. Jaundice, a physical sign observed during the neonatal period is an important cause of neonatal morbidity and mortality [10,11]. The unconjugated (indirect) bilirubin is neurotoxic and the reason for the morbidity associated with hyperbilirubinaemia.

Two main modalities of treatment of NNJ includes exposure of the baby to ultraviolet light (phototherapy) in mild to moderate cases and exchange blood transfusion in severe cases. Delay in the treatment of NNJ could lead to acute bilirubin encephalopathy(kernicterus) resulting from bilirubin staining of the basal ganglia with diffuse neuronal damage which could lead to long term neurologic sequelae such as cerebral palsy, seizure disorders, hearing impairments etc and even death [8,12,13]. Prevention of these deleterious effects of hyperbilirubinaemia calls for early recognition and prompt treatment and thus early recourse to the health care facility [4,8].

It is pertinent to note that an adequate knowledge, right attitude, and practice on the part of mothers to neonatal jaundice will help in mitigating the scourge of neonatal jaundice. Early postnatal discharges from the hospital of apparently healthy neonates could also contribute to the menace of NNJ thus mothers should be equipped with the skill of recognition of jaundice in their babies so as to seek prompt medical attention.

Igboanusi et al [14] in their community study in Northern Nigeria among women of reproductive age reported poor knowledge in 91% and poor attitude to NNJ in 62% of the women studied. This poor knowledge and attitude towards NNJ were similarly observed by other researchers [2,15,16]. It is therefore imperative that mothers have good knowledge and attitude towards NNJ so as to reduce its morbidity and mortality.

No study of this nature has been carried out in the Rivers State University Teaching Hospital therefore the above study was done to assess the knowledge, attitude and practice towards NNJ of pregnant mothers attending the antenatal clinic. This would generate evidence-based information that will help formulate policies that would improve maternal knowledge, their attitude and practices thereby improve neonatal outcomes.

### **Materials and Methods**

This was a cross-sectional questionnaire-based study carried out over a 4-months period from 1<sup>st</sup> March to 30<sup>th</sup> June 2021 in the antenatal clinic (ANC) of the Rivers State University Teaching Hospital (RSUTH). The ANC which is a unit in the Department of Obstetrics and Gynaecology sees an average of 60 patients per clinic day and it is run by consultants, resident doctors and house-officers every Mondays to Fridays while nurses give health talks each clinic day before commencement of the clinic consultations.

The Rivers State University Teaching Hospital is a tertiary hospital owned by the Rivers State Government and receives referral from Primary Healthcare Centres and General Hospitals in all the 23 Local Government areas as well as from private health facilities and neighbouring states. The RSUTH is comprised of the Department of Obstetrics and Gynaecology in addition to other Departments in the hospital such as Paediatrics, Surgery, Internal medicine, Family medicine, Radiology, Pathology, Pharmacy, Nursing etc.

Before commencement of the study, a research team was formed comprising of 3 research assistants who were house officers. A structured training of the research assistants was

**Comment [EM2]:** Briefly, explain why did you decide to use this method.

carried out by the lead researcher on the proper administration of the pre-tested and validated questionnaire including inclusion and exclusion criteria.

The study was explicitly explained to the women attending the ANC and an informed consent obtained. An average of 3-4 pregnant women who gave consent were recruited each day in 3 out of the 5 clinic days while pregnant women who did not give consent to participate in the study were excluded from the study. Non-pregnant women were also excluded from the study.

A convenient sampling size of 149 pregnant women were randomly recruited.

The proforma was administered to every pregnant woman recruited. The information obtained included the socio-demographic characteristics of the participants including the parity, questions which assessed the knowledge of NNJ, attitude and practice towards NNJ. Eight items were used to assess the knowledge of NNJ. Correct answers were scored 1 each and wrong answers were scored 0 and then summed and converted to percentages with a total of 100%. Assessments were then graded good knowledge (70-100%), fair knowledge (50-69.9%) and poor knowledge (0-49.9%). A total of 2 items were used to assess the attitude towards NNJ. A correct answer was scored 1 while wrong answer 0. All items were summed and converted to a total of 100%. Assessments were graded as good attitude ( $\geq 50\%$ ) and poor attitude (0-49.9%). Two items were used to assess the practice of participants towards NNJ. Correct answer was scored 1 and wrong answer 0. All items were summed and converted to 100% and graded as good practice ( $\geq 50\%$ ) and poor attitude (0-49.9%). The reliability test score (Cronbach alpha) for the scale used for assessing the knowledge, attitude, and practice of mothers towards NNJ were 0.500, 0.832 and 0.846 respectively. The reliability coefficient (r) for knowledge was below the required coefficient value of 0.7 but good for attitude and practice.

All the information obtained was entered into an excel spreadsheet and data analysed using SPSS version 23. The data was presented as frequency, percentages and bar chart for categorical variables and as means and standard deviations for continuous variables. Fischer's Exact test was used to test for association while Logistics regression was carried out to test for the strength of the relationship between the variables. Statistical significance was at  $P$  value  $< .05$  at 95% confidence interval.

## Result

### Socio-demographic characteristics of respondents

Of 149 respondents, majority were within age group 29-33 years 58(38.9%), reside in urban areas 117(78.5%) and from South-south geo-political zone 91(61.1%). They were mainly multiparous 65(43.6%), engaged in business/trading 48(32.2%) with tertiary level of education 100(67.1%), Table I.

**Table I: Socio-demographic characteristics of respondents**

| Variables                | Frequency, n=149 (%) |
|--------------------------|----------------------|
| <b>Age group (years)</b> |                      |
| $\leq 28$                | 35 (23.5)            |
| 29-33                    | 58 (38.9)            |

**Comment [EM3]:** What about mothers with mental disorder?

**Comment [EM4]:** The issue of age group should come out clearly under this section (Material and methods)

**Comment [EM5]:** This is a bit confusing. Convenient sampling is non-probability and randomly is probability. How did you manage to do these two techniques at the same time? This should be clearly stated

**Comment [EM6]:** This test is not appearing in the results

**Comment [EM7]:** Which association? Please briefly explain.

**Comment [EM8]:** Which variables. Please explain

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|                                    |            |
|------------------------------------|------------|
| > 33                               | 56 (37.6)  |
| <b>Place of residence</b>          |            |
| Urban                              | 117 (78.5) |
| Rural                              | 32 (21.5)  |
| <b>Geo-political zone</b>          |            |
| South-south                        | 91 (61.1)  |
| South-east                         | 53 (35.6)  |
| South-west                         | 2 (1.3)    |
| North                              | 3 (2.0)    |
| <b>Parity</b>                      |            |
| Nulliparous                        | 39 (26.2)  |
| Primiparous                        | 45 (30.2)  |
| Multiparous                        | 65 (43.6)  |
| <b>Mother's occupation</b>         |            |
| Civil servant                      | 14 (9.4)   |
| Public servant                     | 34 (22.8)  |
| Professional                       | 6 (4.0)    |
| Artisan                            | 19 (12.8)  |
| Business/Trading                   | 48 (32.2)  |
| Unemployed/Housewives              | 28 (18.8)  |
| <b>Mother's level of education</b> |            |
| No formal education                | 2 (1.4)    |
| Primary                            | 6 (4.0)    |

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|           |            |
|-----------|------------|
| Secondary | 41 (27.5)  |
| Tertiary  | 100 (67.1) |

**Knowledge of neonatal jaundice among pregnant mothers**

Majority had heard of NNJ 82(55.0%), correctly defined NNJ 77(51.7%) but only 16(10.7%) could mention at least one correct cause of NNJ. Six (4.0%) women had knowledge of the area of the body jaundice appeared first in babies while 43(28.9%) and 8(5.4%) knew the complication(s) and danger(s) signs of NNJ respectively. Majority knew NNJ is treatable 121(87.7%) and knew appropriate treatment for jaundice 95(63.8%). Ninety-five (63.8%) women knew NNJ was preventable, but none knew any preventive method. Only 1(0.7%) respondent was assessed to have good knowledge of NNJ while 34(22.8%) and 114(76.5%) had fair and poor knowledge of NNJ respectively, Table II.

**Table II: Knowledge of Neonatal jaundice among pregnant mothers**

| Variables                                           | Frequency, n=149 (%) |
|-----------------------------------------------------|----------------------|
| <b>Ever heard of NNJ</b>                            |                      |
| Yes                                                 | 82 (55.0)            |
| No                                                  | 67 (45.0)            |
| <b>Definition of NNJ</b>                            |                      |
| Correct answer                                      | 77 (51.7)            |
| Wrong answer/No idea                                | 72 (48.3)            |
| <b>Cause(s) of NNJ</b>                              |                      |
| Mentioned at least one correct answer               | 16 (10.7)            |
| Wrong answer/No idea                                | 133 (89.3)           |
| <b>Area of body jaundice appears 1<sup>st</sup></b> |                      |
| Correct answer                                      | 6 (4.0)              |
| Wrong answer/No idea                                | 143 (96.0)           |
| <b>Complication(s) of NNJ</b>                       |                      |
| Correct answer                                      | 43 (28.9)            |
| Wrong answer/No idea                                | 106 (71.1)           |

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**Danger sign(s) of NNJ**

|                      |            |
|----------------------|------------|
| Correct answer       | 8 (5.4)    |
| Wrong answer/No idea | 141 (94.6) |

**NNJ being treatable**

|     |            |
|-----|------------|
| Yes | 121 (81.2) |
| No  | 28 (18.8)  |

**Knows appropriate treatment for jaundice**

|     |           |
|-----|-----------|
| Yes | 95 (63.8) |
| No  | 54 (36.2) |

**Knows NNJ is preventable**

|     |           |
|-----|-----------|
| Yes | 95 (63.8) |
| No  | 54 (36.2) |

**Knows at least one prevention method**

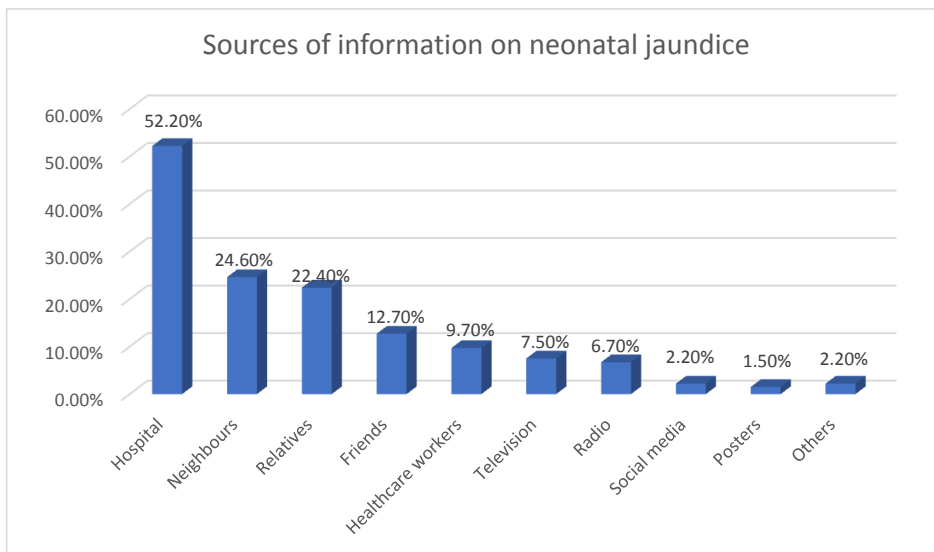
|     |             |
|-----|-------------|
| Yes | 0           |
| No  | 149 (100.0) |

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**Sources of information on neonatal jaundice**

The commonest source of information on NNJ was from the hospital 70(52.2%) followed by from neighbours 33(24.6%) and relatives 30(22.4%) while the least were from school, market and self-knowledge grouped as others 3(2.2%) with equal distribution, Figure 1.

**Comment [EM9]:** Source of information should link with ever heard NNJ.



**Figure 1: Sources of information on neonatal jaundice**

**Attitudes of pregnant mothers towards neonatal jaundice**

Majority of respondents would visit the hospital once jaundice was observed in their babies 132(88.6%) whereas most respondents who would not visit the hospital preferred exposure to early morning sun 8 (44.4%). One hundred and thirty-one respondents (87.9%) would consent to blood transfusion as a form of treatment if the need arose. For those who would not consent to blood transfusion, no reason was given by majority of the respondents 9(50.0%). One hundred and twenty (80.5%) respondents had good attitude towards NNJ and 29(19.5%) had poor attitude, Table III.

**Table III: Attitudes of pregnant mothers towards neonatal jaundice**

| Variables                                           | Frequency, n=149 (%) |
|-----------------------------------------------------|----------------------|
| <b>Would visit the hospital once NNJ is noticed</b> |                      |
| Yes                                                 | 132 (88.6)           |
| No                                                  | 17 (11.4)            |
| <b>If No, would prefer (multiple answers), n=18</b> |                      |
| Early morning sun                                   | 8 (44.4)             |
| Glucose water                                       | 3 (16.7)             |
| Abidec drop                                         | 2 (11.1)             |
| No specific answer                                  | 5 (27.8)             |

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**Would consent to blood transfusion if need arises**

|     |            |
|-----|------------|
| Yes | 131 (87.9) |
| No  | 18 (12.1)  |

**If No, why**

|                                        |          |
|----------------------------------------|----------|
| Religion                               | 5 (27.8) |
| Not comfortable with blood transfusion | 4 (22.2) |
| No reason given                        | 9 (50.0) |

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**Practice of pregnant mothers towards neonatal jaundice**

Most of the respondents had no child(ren) with NNJ 124(83.2%). Of the 25(16.8%) respondents whose child(ren) had NNJ, majority took their child(ren) with NNJ to the hospital 20(80.0%). For those who did not visit the hospital with their jaundiced baby, majority preferred mainly the exposure of their child(ren) to early morning sun 4(40.0%). Most of the respondents presented their babies to the hospital within 24 hours after jaundice was noticed 12(60.0%) with most of them being alive 24(96.0%). Twelve (8.1%) respondents had good practice while 137(91.9%) had poor practice, Table IV.

**Table IV: Practice of pregnant mothers towards neonatal jaundice**

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| Variables | Frequency, n=149 (%) |
|-----------|----------------------|
|-----------|----------------------|

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**Child(ren) ever had NNJ**

|     |            |
|-----|------------|
| Yes | 25 (16.8)  |
| No  | 124 (83.2) |

**Took child to the hospital for treatment**

|     |           |
|-----|-----------|
| Yes | 20 (80.0) |
| No  | 5 (20.0)  |

**If No, mother's preference (multiple answers), n=10**

|                   |          |
|-------------------|----------|
| Early morning sun | 4 (40.0) |
| Glucose water     | 2 (20.0) |
| Ampiclox drop     | 2 (20.0) |

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|                                                                |           |
|----------------------------------------------------------------|-----------|
| Abidec drop                                                    | 2 (20.0)  |
| <b>Time of presentation after jaundice was noticed (hours)</b> |           |
| < 24                                                           | 12 (60.0) |
| 24-48                                                          | 3 (15.0)  |
| > 48                                                           | 5 (25.0)  |
| <b>Outcome of child(ren) with NNJ</b>                          |           |
| Alive                                                          | 24 (96.0) |
| Died                                                           | 1 (4.0)   |

**Association between sociodemographic characteristics and knowledge of NNJ**

There was no statistical significance in the association between respondent's age, place of residence, geo-political zone, parity, mother's occupation and mother's level of education and the level of knowledge of the respondents ( $P$  value > .05), Table V.

**Table V: Association between sociodemographic characteristics and knowledge of NNJ**

| Variables                 | Knowledge level     |                 | P value |
|---------------------------|---------------------|-----------------|---------|
|                           | Good/Fair, n=35 (%) | Poor, n=114 (%) |         |
| <b>Age group (years)</b>  |                     |                 |         |
| ≤ 28                      | 9 (25.7)            | 26 (22.8)       | .910    |
| 29-33                     | 14 (40.0)           | 44 (38.6)       |         |
| > 33                      | 12 (34.3)           | 44 (38.6)       |         |
| <b>Place of residence</b> |                     |                 |         |
| Urban                     | 29 (82.9)           | 88 (77.2)       | .639    |
| Rural                     | 6 (17.1)            | 26 (22.8)       |         |
| <b>Geo-political zone</b> |                     |                 |         |
| South-south               | 23 (65.7)           | 68 (59.6)       | .806    |
| South-east                | 11 (31.4)           | 42 (36.8)       |         |

**Comment [EM10]:** This age group mean pregnant women from 0-28 years. This is not a correct grouping. Can you find pregnant women of let say 5 or 9 years etc.

**Comment [EM11]:** Why this grouping?

|                                    |           |           |      |
|------------------------------------|-----------|-----------|------|
| South-west                         | 0         | 2 (1.8)   |      |
| North                              | 1 (2.9)   | 2 (1.8)   |      |
| <b>Parity</b>                      |           |           |      |
| Nulliparous                        | 5 (14.3)  | 34 (29.8) |      |
| Primiparous                        | 12 (34.3) | 33 (28.9) | .186 |
| Multiparous                        | 18 (51.4) | 47 (41.2) |      |
| <b>Mother's occupation</b>         |           |           |      |
| Civil servants                     | 2 (5.7)   | 12 (10.5) |      |
| Public servants                    | 11 (31.4) | 23 (20.2) |      |
| Professionals                      | 3 (8.6)   | 3 (2.6)   |      |
| Artisan                            | 4 (11.4)  | 15 (13.2) | .326 |
| Business/Trading                   | 8 (22.9)  | 40 (35.1) |      |
| Unemployed/Housewives              | 7 (20.0)  | 21 (18.4) |      |
| <b>Mother's level of education</b> |           |           |      |
| No formal education                | 0         | 2 (1.8)   |      |
| Primary                            | 1 (2.9)   | 5 (4.4)   | .837 |
| Secondary                          | 8 (22.9)  | 33 (28.9) |      |
| Tertiary                           | 26 (74.3) | 74 (64.9) |      |

**Relationship between knowledge, Attitude and Practice level of NNJ among respondents**

There was statistically significant association between the knowledge level and attitude level ( $P$  value = .003) as well as the knowledge level and practice level ( $P$  value = .001), Table VI.

**Table VI: Relationship between knowledge, Attitude and Practice level of NNJ among respondents**

| Variables | Knowledge level     | $P$ value       |
|-----------|---------------------|-----------------|
|           | Good/Fair, n=35 (%) | Poor, n=114 (%) |

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**Attitude level**

|      |           |           |                                     |
|------|-----------|-----------|-------------------------------------|
| Good | 34 (97.1) | 86 (75.4) | <b>.003</b>                         |
|      |           |           | <b>OR(95% CI):8.2(1.173-57.567)</b> |
| Poor | 1 (2.9)   | 28 (24.6) |                                     |

**Practice level**

|      |           |            |                                    |
|------|-----------|------------|------------------------------------|
| Good | 8 (22.9)  | 4 (3.5)    | <b>.001</b>                        |
|      |           |            | <b>OR(95% CI):3.4(2.004-5.711)</b> |
| Poor | 27 (77.1) | 110 (96.5) |                                    |

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**DISCUSSION**

A little over half of the mothers in our study had heard of NNJ and could correctly define it. This is less than the finding by Egube et al [17] in a study carried out in Benin-city and the study by Eneh et al [18] in Port Harcourt but similar though slightly higher than the findings of Salia et al in Ghana [19]. Though the age group of most of the caregivers in all four studies was similar (25-35 years), the study by Egube et al [17] in Benin had a much higher sample size (389 respondents) when compared to that of the present study and this may account for the difference reported. The study by Eneh et al [18] also had a higher sample size of 255 respondents. The study by Salia et al [19] had caregivers with similar demographics (age-group, marital status and level of education) but was carried out in Ghana.

Although majority of the mothers in our study knew what NNJ was and could correctly define it only 28.9% recognised the complications of NNJ and only 5.4% of the caregivers knew any danger sign. This was similar to the finding in an earlier study in Port Harcourt by Eneh et al [18] who documented only 22% being able to recognise brain damage as a possible complication of NNJ. This is similar to that reported by the study in Benin [17] where majority of the mothers did not know any danger sign and could not identify any complications of NNJ. This poses a very serious challenge as the caregivers even when they recognise the presence of NNJ, may not present early enough to the hospital for appropriate care as they may not recognise the danger signs even when present.

Majority of the mothers in our study (87.7%) knew NNJ was treatable and up to 63.8% of them knew appropriate treatment measures. This was unlike the finding reported earlier by Eneh et al [18] where up to 50.7% of mothers did not know appropriate treatment measures (33% of the mothers recommended exposure to sunlight for treatment and 26.7% recommended glucose water for treatment). This difference in knowledge base could be attributed to the fact that only 54.2% of the mothers in the study by Eneh et al [18] had tertiary education unlike the 67.1% of mothers in our study who had tertiary education. A study by Aggarwal et al [20] in India similarly reported only 15% of mothers knew appropriate treatment measures for NNJ with up to 20% of the mothers recommending the

**Comment [EM12]:** Pregnant mothers.

use of incantations, wrapping of black thread around the cord and exposure to sunlight for treatment. This is not surprising as about 15% of the mothers in the latter study had no formal education and only 39% had tertiary education. Cultural beliefs, traditional infant care practices and reduced knowledge could be factors possibly responsible for this observation.

Though most of the mothers in our study (63.8%) knew NNJ was preventable none of them knew any preventive measures. This is like the findings of other authors [17,18,19,20,21]. This buttresses the fact that maternal education about NNJ, its causative factors, treatment modalities and preventive measures are highly required and advocated for to reduce neonatal morbidity and mortality.

The commonest source of information on NNJ as reported by our study was from the hospital (52.2%) then neighbours and then relatives. Similarly, the study in Abia state by Onyearugha et al [21] reported 50% of caregivers had health workers as their source of information. Eneh et al [18] reported a slightly lower figure of 44.7% of mother's having their source of information as health care workers. With the current trend of the increasing use of social media as a source of information dissemination, the health sector would have to engage more in this regard-using social media as an effective means of dissemination of information concerning NNJ, its' risk factors, preventive and treatment measures.

Most of the respondents in our study would take their babies to the hospital as soon as jaundice was noticed and would consent to blood transfusion if indicated. This is unlike that reported in India [20] where only 20% of mothers would take their affected infant to the hospital. This could also be attributable to the fact that the women in the present study were more educated than in the latter study (most of the mothers in our study had tertiary education whereas only 39% of the mothers in the study in India [20] had tertiary education and 15% of mothers were completely illiterate). It is worthy of note that 25% of the mothers in our study who would not consent to blood transfusion attributed this to their religious beliefs. Severe NNJ is known to cause neurologic complications including seizure disorders, hearing deficit and cerebral palsy [22]. It has been reported as the causative factor in as many as 1/3<sup>rd</sup> of all cerebral palsy patients in a paediatric neurology clinic [23]. A previous study carried out in our centre also showed NNJ accounting for the 3<sup>rd</sup> commonest predisposing factor of neurologic disorders after perinatal asphyxia and meningitis [24]. Some centres have reported as high as 17-22% of babies with severe NNJ receiving exchange blood transfusions as urgent treatment to rapidly lower their bilirubin levels [25,26]. Thus, the need to engage religious and cultural leaders to serve as advocates in the fight against NNJ to reduce infant morbidity and mortality cannot be overemphasized.

Majority of mothers whose babies had NNJ took their babies within 24 hours to the hospital for treatment. Those who did not, mostly used early morning sun, Ampiclox and Abidec drops as well as glucose water for supposed treatment. Aggarwal et al [20] in contrast reported only 20% of affected babies were taken to the hospital by their mothers within 24 hours. Others used incantations, herbs, application of special black thread as well as early morning sun as supposed therapy. Again, the effects of poor education and cultural beliefs are implicated as being responsible for this difference.

Our study showed majority (76.5%) of mothers had poor knowledge, about 22.8% had fair knowledge and only 1(0.7%) mother had good knowledge. This observation was somewhat surprising as majority of the mothers in our study had tertiary education. However, this fact also implies these mothers most likely have greater access to the internet and social media; thus, more exposure to information both correct and incorrect about NNJ. Our study

showed majority of mothers had poor practice but good attitude with regards to NNJ. This observation was not surprising as poor knowledge influences one's practice. The fact that majority had good attitude would suggest that with increase in dissemination of appropriate evidence-based information about NNJ, its preventive measures and management, mothers at our centre could have improved/better practice subsequently. Our finding was similar to that reported by Aggarwal et al [20] in India where majority of the mothers had poor knowledge, poor attitude and in addition, poor practice. Again, poor education and sociocultural factors may be responsible for this difference. In Nigeria, Ogunfowora et al [2] reported poor knowledge and practice to NNJ while Igboanusi et al [14] documented poor knowledge in 91% and poor attitude in 62% of respondents. In contrast, Salia et al [19] documented slightly less than half of caregivers demonstrated good knowledge (45.5%) and attitude (47.5%) while 58.9% had good practices regarding NNJ. This difference could be attributed to difference in geographic location and possible difference in the perception of NNJ. The level of education of the respondents was not documented in the latter study although in the present study, more than 2/3<sup>rd</sup> had tertiary education.

Our study found no significant association between Knowledge and sociodemographic factors. However, there was significant association between Knowledge and mother's attitude (P value=.003) and practice (P value=.001). Similarly, Ogunlesi et al [27] found no significant association of knowledge with religion and marital status but found significant association between knowledge and practice as observed in the present study. They reported that mothers with good knowledge had better care-seeking behaviour [27]. Salia et al [19] in Ghana reported caregivers who had prior awareness and received education on NNJ were 3 times more likely to have good knowledge than those without previous education. Thus, efforts to promote well informed and improved caregivers' attitude will improve maternal health-seeking behaviour and reduce disabilities and death through early detection and intervention of infants with NNJ [19,20,21,25,27].

## CONCLUSION

Pregnant women in Port Harcourt had poor knowledge and poor practice towards NNJ but had good attitude towards NNJ. The need to intensify health education in pregnant women, health workers, religious, cultural leaders and the public at large about NNJ, its complications and preventive measures cannot be over emphasized.

**Comment [EM13]:** Where is this name coming from?! Can the name of this city/town be mentioned under the results section? So that to have a good link between the results and conclusion.

**Comment [EM14]:** Insufficient knowledge is the right word to use

**Comment [EM15]:** This part of conclusion does not reflect your findings. Ca you please rephrase it.

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UNDER PEER REVIEW