

Research Article

Studying the Role of Effective Factors on the Infants' Admission in Neonatal Intensive Care Unit

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ABSTRACT

Background and aims: Whereas, the neonatal intensive care specifically set for unwell infants that require special care and regarding the point that today despite the considerable developments in medical sciences, the number of the infants that need special care also increased, the present study was conducted with the aim of studying the role of the effective factors on infants' admission in NICU of Hajar Hospital in Shahrekord city.

Method: The present study was conducted as a descriptive, analytical, cross sectional via simple sampling method in Hajar Hospital in Shahrekord city years 2010-2013. For this aim, the admitted infants in NICU were studied during the mentioned period.

Results: The results obtained from the present study showed that among the 820 infants admitted in NICU, the most common factor for admission was preterm (48.6%) and congenital disorders (15.2%).

Conclusion: According to the results, it could be said that the main problem about the infants is preterm delivery that should be prevented through necessary measures.

Keywords: Admission, Neonate, NICU

INTRODUCTION

The neonatal mortality rate and maternal mortality rate are considered as the most important variables in assessing the health status of a region. (1) Knowing the reason for such mortalities is one of the acceptable and effective factors in defining the related cares in delivery period and neonatal period. In this regard, the high risk infants should be identified and some effective measures should be taken for preserving their health status. High risk infants are the infants with high mortality rate that should be under strict supervision of experienced physicians and nurses (2). The high risk infants are mostly categorized in terms of the birth weight, pregnancy age and pathologic problems. Most of these problems occur due to the physiologic status along with caring the infant in terms of the birth age and chemical disorders (Hypoglycemia, Hypocalcaemia etc.)

and due to immaturity of the organs and systems (Hyper- bilirubinemia, respiratory distress syndrome, hypothermia) (3). Nearly 9% of all births require neonatal intensive care. This kind of care usually continues for some days, but it may last from some hours to some months (4). Institute of Child Health and Human Development has founded NICU specialized in caring the ill or immature infants (5). In this part, all the caring measures for the newborn babies are conducted in order to decrease the environmental, physical and social stressors to provide the infant's convenience from the admission stage to the permission. It has adverse consequences for neonate and their parents because of physical, psychological, and emotional separation (6). This unit is equipped with some complicated devices and screeners (7). Whereas this group of infants require some

intensive care and considering that performing different procedures on this group cause emergence of some other problems and iatrogenic events seriously and continuously, so that 1% of these events are fatal and unavoidable (8). On the other hand, the mortality rate is high among these infants, so that it reaches to 34% in some reports (9). Ideally it is attempted to the infants born in a condition with minimum problems that they don't need to be admitted in this unit. Tracy et al. studied the admission rate of the infants of low risk mothers in terms of the delivery method and found that all the term infants admitted in intensive care unit was 8.9% in nulliparous women and 6.3% in multiparous women (10). In other regions and studied, it was stated that the infants of the women that had bleeding before childbirth that became pregnant through assisted reproductive techniques and born baby boy are highly in danger of being admitted in intensive care unit (2,11, 12). Considering the mentioned issues and distinction of each effective factor on admission in different regions in one side and admission in intensive care units that require excessive expenses and skilled and experienced personnel on the other side, and regarding the point that these factors are not studied specifically in Chaharmahal and Bakhtiari Province; therefore, the necessity of conducting the present study with the aim of defining the relation between effective factors with the infants admission in NICU of this province is highly crucial. With the aim of identifying the reasons that lead to transfer the newborn baby to NICU and prevent such problems besides identifying the reasons for admission of infants in NICU and preventing them, it is hoped that we can have an effective role in developing prognosis and saving the life of this vulnerable group and develop the health indicators of the region and consequently promote the health level in the province.

MATERIAL AND METHODS

The present study was conducted as a descriptive, analytical, cross sectional via simple sampling method in Hajar Hospital in Shahrekord city years 2010-2013. For this aim,

the admitted infants in NICU were studied during the mentioned period.

Statistical Population and Research Sample: includes the new born babies admitted in NICU that were born at Hajar Hospital, Shahrekord city or have been dispatched to this hospital.

Sample Size: the sample size was calculated according to the comments of statistical expert and via statistical formula $n = \frac{Z^2 \cdot pq}{d^2}$ as 787 persons ($P=0/09$, $q=0/91$, $\alpha=0/05$, $z=1/96$, $d=0/02$). The data gathered via the researcher made questionnaire including the individual characteristics and different questions related to the effective factors on the infants' admission at NICU that was extracted from table 91-1, Nelson Essentials of Pediatrics. Then, the questionnaire was provided to some experts in the field of pediatrics and midwifery. After studying the questionnaire, their comments were applied. In order to fill the questionnaire while observing the ethical issues, the archived records were used besides interview with the mothers and included all the admitted infants that has been admitted immediately after delivery or some days after admission.

Sampling time included from the time of getting permission to the time that the questionnaire was filled as 3.5 years. The questionnaires were completed by one expert in the field of nursing that was working in NICU. After gathering the information via SPSS21 Software, some descriptive statistics same as average and standard deviation of the results of the study were analyzed.

RESULTS

The results showed that among 820 admitted infants at NICU, 58.5% were boys, 41.3% were girls and 0.2% were gender unknown. Apgar score for 76.8% of the infants was higher than 7 and for 23.2% was less than 7. About 90.1% of the infants were born at Hajar hospital and the mother and father of 58.3% of the infants had no family relationship. The rate of twin pregnancy was 14.6%. The infants' weight ranged from 400-6500 gr with average of 2480 ± 79 , height from 28- 57 cm with average of 46.67 ± 4.61 , head circumference from 21- 49 cm and average of 32.88 ± 3.09 , Apgar score from 1-9 with average of 7.31 ± 1.65

The role of humanistic and social factors: the age of mother ranged from 16- 45 years, there was no mother with age less than 16 years, but there was 11 persons in age of 40 years old and 6 persons older than 40 (0.8%).

Regarding the consumption of unpermitted drugs, the results showed that among the mothers of 820 infants that were admitted in this unit, 1.3% were involved with substance abuse, 0.1% with alcohol addiction and 0.6% with smoking. 9.6% of the mothers were exposed to cigarettes smoke. Previous Pregnancies: 35 mothers (4.3%) have IUFD, 21 mothers (2.6%) have infant death, 31 mothers (3.9%) have previous immature birth, 6 mothers (0.7%) have IUGR, 11 mothers (1.4%) have disorder infant, 8 mothers (1%) have cervical insufficiency, 1 mother (0.1%) has blood disorder, 96 persons (11.9%) have neonatal jaundice and didn't have any infant hydrops.

Current Pregnancy: vaginal bleeding in 70 mothers (9.2%), genital infection in 67 mothers (8.5%), amniotic fluid volume disorder in 52 mothers (6.6%) that 29 individuals (6.8%) was polyhydramnios and 23 individuals (5.4%) was oligo hydramnios, 27 individuals had surgery (3.4%), 4 individuals appendectomy, 18 individuals cerclage, 1 individual infant reduction, 1 individual stitch openness, 1 individual ovarian cyst and 1 individual feet surgery due to trauma, 33 individuals (11.1%) oral problems, 22 individuals toothache, 7 individuals tooth decay, 2 individuals tooth break, 2 individuals gum bleeding, 13 individuals (2.4%) without perinatal cares, 11 individuals (1.4%) thrombophlebitis, 57 individuals (8.4%) unnatural Sonography, 79 individuals (10%) infertility treatment. 14.6% of the deliveries was twins.

Delivery Status: 33 individuals (4%) respiratory distress, 27 individuals (3.3%) meconium passage, 1 individual (0.1%) wrap around fatal neck, 4 individuals (0.5%) forceps with vacuum, 529 individuals (65.4%) respiratory problems.

The Infant Status: 48.7% was under 37 pregnancy weeks and there was no item higher than 42 weeks. 45.7% was under 2500 gam and 1.3% was higher than 4000. 15.2% had disordered infants.

DISCUSSION

The role of humanistic and social factors: there was no mother with age less than 16 years, but there was 11 persons in age of 40 years old and 5 persons older than 40 (0.8%).the age less than 16 and higher than 40 years and physical and psychological traumas can face the infant to risk (12). The most appropriate age for the woman to be pregnant is between 20 to 30 (13) and the age higher than 35 years will expose the mother pregnancy to some risk (14). There was 18 items psychological trauma (2.2%) and 41 items physical trauma (5%). Williams states that more than 20% of the pregnant mothers suffer from physical trauma (15).

Regarding the consumption of unpermitted drugs, the results showed that among the mothers of 820 infants that were admitted in this unit, 1.3% were involved with substance abuse, 0.1% with alcohol addiction and 0.6% with smoking. 9.6% of the mothers were exposed to cigarettes smoke. Vojdani Nia reported in his study that among 4317 participants, 60 individuals (1.4%) suffered from drug use, 79 individuals (1.8%) from smoking and 616 individuals (14.3%) from consumption of unsecure drugs (16).

Regarding the role of the factor of previous records, hypertension was observed among 133 individuals, 11 items before pregnancy and 122 items during pregnancy. Hypertension disorders in pregnancy included 5-7% of the pregnancies (17) that was calculated as 1.8% in women with overweight in compare to normal weight and as 3.1% in fat women (18).

Urinary infection was observed among 173 items (21.09%). It was reported that the urinary infection was spread in Nigeria as 14.6% (19).

Previous Pregnancies: 35 mothers (4.3%) have IUFD in the present study and in University Hospital of Montreal in Canada during 2001-2007, there was 87 item IUFD among total 20744 individuals (20). Moreover in France, there was 5% IUFD (21).

One study reported rate of immature infants' mortality in delivery room as 5.7 and as 9.9 in NICU (22). The infants' mortality rate was reported as 21 items (2.6%) in the present study. The immature birth was 31 items (3.9%) that will increase the chance for preterm delivery in

next delivery (23). IUGR rate was reported as 6 items (0.7%, diabetic 16 items and pregnancy diabetic 15 items). The studies showed that IUGR was increased in spite of technology development and more accurate prenatal cares and the mortality rate are higher in this group of infants in compare to normal infants (24).

The disordered infant birth was reported as 11 items (1.4%). In one study conducted in Ethiopia, congenital disorders was reported as 2%, it was double in boys in compare to girls (25).

Cervical insufficiency will cause to cervix opening due to some changes in cervix (26) and the cervix length less than 25mm before 24 weeks pregnancy will be considered as cervical insufficiency (27, 28) and was reported in 8 (23%) of mothers.

Vaginal bleeding in 70 mothers (9.9%). Vaginal bleeding will expose the pregnancy into risk and will lead to admission of more infants in intensive care unit (28-30). amniotic fluid volume disorder in 52 mothers (6.6%) polyhydramnios and oligo hydramnios, was observed in 2-4% of the pregnancies .In this research 27 individuals had surgery (3.4%) during 1973 to 1981 among 720000 pregnant women had surgeries other than midwifery (31).

Regarding the problems in pregnancy, insufficient prenatal cares (less than 8 times) was reported as 60 items (14.9%). In years 2007-2008, 85.4% of the women in America had received insufficient prenatal cares (32) and it was observed that receiving less than 8 times pregnancy cares relates to increasing the lightweight infant birth (33).

Infertility treatment was reported as 79 items (10%), these women with infertility records had the chance of increasing the pregnancy complications despite receiving sufficient cares (34, 35).

Delivery Status: 4 individuals (0.5%) forceps with vacuum, 267 individuals (32.8%) infants of natural delivery and 548 individuals (67.2%) of cesarean delivery. In one study conducted at southeast side of Brazil, the infants of cesarean delivery was calculated as 8.3% against 1.8% infants of natural delivery were admitted at intensive care unit (36).

The rate of twin pregnancy was 14.6%. It was estimated that 1 in 80 births will be multi fetus that will apply more complications for pregnancy (31).

Regarding the newborn baby, 48.6% of the infants were preterm. Preterm delivery is one of the critical issues in the health status of the world that will be followed by many complications that will consequently lead to infant death (37). In 1984 in America, 9.4% of the deliveries was preterm and in year 2006, this amount reached to 12.8% and in year 2011, it reached to 11.7%. The preterm delivery issue is still one of the most critical challenges in the field of midwifery (38, 39) and the most of the infants admitted in the intensive care unit of the present study was preterm delivery. Congenital anomaly was observed as 122 individuals (15.2%). At two intensive care units at Montreal Hospital in Canada, the reason for admission of the infants at NICU among 625 infants, 51% was admitted in this unit due to congenital anomaly and surgery (40).

Between 445 Tanzanian neonate hospitalized 41 (29%) of them had anomaly (41) .10% of neonatal in NICU have congenital anomalies (42).

CONCLUSION:

In this study, the most premature infants were admitted to intensive care unit.

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REFERENCES:

1. Ahmadi A , Javadi A. Trends and Determinants of Infant Mortality Rate in Fars Province during 2001-2011. *Journal of Rafsanjan University of Medical*, 2015 (14):37-46
2. Kliegman, R., Stanton, B., St. Geme, J. W., Schor, N. F., & Behrman, R. E. (2016). *Nelson textbook of pediatrics* (Edition 20.). Philadelphia, PA Wong's Nursing Care of

- Infants and Children.2003. 7th Edition (Seventh Edition) Paperback
3. by Wilson, Winkelstein, Kline Hockenberry (Author)
 4. Wilson.d, winkelsten.M; klinc.n-Wongs. Nursing care of infants and children 7 edition. mosby 2003; page: 395.
 5. kinneg mc, james es, murray s.r, ashwill s.s .maternal_child nursing 2 th edition Elsevier saunders 2005 page: 606
 6. Als H, McAnulty GB. The Newborn Individualized Developmental Care and Assessment Program (NIDCAP) with Kangaroo Mother Care (KMC): Comprehensive Care for Preterm Infants. Current women's health reviews. 2011;7(3):288-301.
 7. Araki S, Saito T, Ichikawa S, Saito K, Takada T, Noguchi S, Yamada M, Nakagawa F.Family-Centered Care in Neonatal Intensive Care Units: Combining Intensive Care and Family Support. JOURNAL of UOEH. 2017;39(3):235-240.
 8. Heidari H.Golchin M. Ziayy , SH.Salehi,Collection structure national standards in neonatal intensive care unit according to the international standards in years 2006-2007. - The Horizon of Medical Sciences. 2006; 12 (3):22-28
 9. Ligi I, Arnaud F, Jouve E, Tardieu S, Sambuc R, Simeoni U. Iatrogenic events in admitted neonates: a prospective cohort study. Lancet. 2008 Feb 2;371(9610):364-5.
 - 10.Saulez MN, Gummow B, Slovis NM, Byars TD, Frazer M, MacGillivray K, Bain FT. Admission clinicopathological data, length of stay, cost and mortality in an equine neonatal intensive care unit Journal of the South African Veterinary Association 2007 Sep;78(3):153-7.
 - 11.Tracy SK, Tracy MB, Sullivan E. Admission of term infants to neonatal intensive care: a population-based study. Birth. 2007 Dec;34(4):301-7.
 - 12.Kaini NR, Chaudhary D, Adhikary V, Bhattacharya S, Lamsal M. Overview of cases and prevalence of jaundice in neonatal intensive care unit. Nepal Medical College Journal (NMCJ). 2006 Jun;8(2):133-5.
 - 13.Robert M. Kliegman , Bonita M.D. Stanton , Joseph St. Geme ,Nina F Schor.Nelson Textbook of Pediatrics, 19th Edition
 - 14.Bromiker R, Hammerman C, Chertman L, Ioscovich A, Granovsky-Grisaru S, Samueloff A, Elstein D. Schimmel MS .The effects of maternal age and parity on maternal and neonatal outcome. Archives of Gynecology and Obstetrics. 2015 Apr;291(4):793-8.
 - 15.Almeida RM, Adverse perinatal outcomes for advanced maternal age: a cross-sectional study of Brazilian births..Pedreira CE J Pediatr (Rio J). 2015 Sep-Oct;91(5):493-8.
 - 16.Gunningham, F., Leveno, Kenneth,Bloom, Steven,Spong, Catherine Y,Dashe, Jodi S et al .(2014). Williams Obstetrics, 24e, McGraw-hill.
 - 17.Ramezandadeh F , Tvafrican S , Vahdani nia M , Shariat M , Montazeri A.Maternal and fetal outcomes associated with drug abuse , smoking and unsafe drug during pregnancy.J Hakim : Volume 10 , Number 3;2005; pages 9 – 16.
 - 18.Gary Cunningham F, Kenneth J. Leveno, Steven L. Bloom, Catherine Y. Spong, , Jodi S. Dashe, , Barbara L. Hoffman, Brian M. Casey, Jeanne S. Sheffield Hypertensive Disorders.. in: Williams Obstetrics, 24e New York.:Mc Graw Hill;2014; p:728-80.
 - 19.Gudnadóttir TA, Bateman BT, Hernández-Díaz S, Luque-Fernandez MA, Valdimarsdóttir U, Zoega H.Body Mass Index, Smoking and Hypertensive Disorders during Pregnancy: A Population Based Case-Control Study. PLoS One. 2016 Mar 24;11(3):e0152187.
 - 20.Olamijulo JA, Adewale CO, Olaleye O. Asymptomatic bacteriuria among antenatal women in Lagos. Journal of Obstetrics and Gynaecology. Aug;36(6):722-725.
 - 21.Walfisch A, Brown R, Mallozzi A, Hallak M, Shrim A. Maternal characteristics of pregnancies with intrauterine fetal demise. Journal of Perinatal Medicine. 2016 Oct 1;44(7):779-784. doi: 10.1515/jpm-2015-0135.
 - 22.Quibel T, Bultez T, Nizard J, Subtil D, Huchon C, Rozenberg P. [In utero fetal **death**]. Journal de Gynécologie Obstétrique

- et Biologie de la Reproduction. 2014 Nov 6;43(10):883-907.
23. Chen F, Bajwa NM, Rimensberger PC, Posfay-Barbe KM, Pfister RE; Swiss Neonatal Network. Thirteen-year mortality and morbidity in preterm infants in Switzerland. *Archives of Disease in Childhood. Fetal and Neonatal Edition*. 2016 Sep;101(5):F377-83.
 24. Hudic I, Stray-Pedersen B, Skokic F, Fatusic Z, Zildzic-Moralic A, Skokic M, Fatusic J. low preterm birth rate with decreasing early neonatal mortality in bosnia and herzegovina during 2007-2014. *Mater Sociomed*. 2016 Feb;28(1):32-5
 25. Sharma D, Farahbakhsh N, Shastri S, Sharma P. Intrauterine growth restriction - part 1. *The Journal of Maternal-Fetal & Neonatal Medicine*. 2016 Dec;29(24):3977-87.
 26. Mekonen HK, Nigatu B, Lamers WH. Birth weight by gestational age and congenital malformations in Northern Ethiopia. *BMC Pregnancy Childbirth*. 2015 Mar 29;15:76.
 27. Roman A, Rochelson B, Martinelli P, Saccone G, Harris K, Zork N, Spiel M, O'Brien Calluzi, Palomares K, Rosen T, Berghella V, Fleischer A. Cerclage in twin pregnancy with dilated cervix between 16 to 24 weeks of gestation: retrospective cohort study. *American Journal of Obstetrics & Gynecology*. 2016 Jul;215(1):98.e1-98.e11.
 28. Sim S, Da Silva Costa F, Araujo Júnior E, Sheehan PM, Aust N Z. Factors associated with spontaneous preterm birth risk assessed by transvaginal ultrasound following cervical cerclage. *Journal of Obstetrics & Gynecology*. 2015 Aug;55(4):344-9.
 29. Noelia M Zork, , Kristin Marie Myers, , Ms. Kyoko Yoshida, Serge Cremers, , Hongfeng Jiang, MD, , Cande V Ananth, , , Ronald Wapner, , Jan Kitajewski, , and Joy Vink. A Systematic Evaluation of Collagen Crosslinks in the Human Cervix. *American Journal of Obstetrics & Gynecology*. . 2015 Mar; 212(3): 321.e1-321.e8.
 30. Hosseini Maryam Sadat . Yaghoobipour Soghra. Late Pregnancy Outcomes in Women with Vaginal Bleeding in Their First Trimester. *Journal of Obstetrics and Gynecology of India*. 2013 Oct; 63(5): 311-315.
 31. Reem Hasana, b, Michele L. Jonsson Funkb, Amy H. Herringc, d, Andrew F. Olshanb, d, Katherine E. Hartmanne, f, and Donna D. Accuracy of Reporting Bleeding During Pregnancy . *Paediatric and Perinatal Epidemiology*. 2010 Jan; 24(1): 31-34.
 32. Gary Cunningham F, Kenneth J. Leveno, Steven L. Bloom, Catherine Y. Spong, , Jodi S. Dashe, , Barbara L. Hoffman, Brian M. Casey, Jeanne S. Sheffield Amniotic fluid . in: *Williams Obstetrics, 24e New York: Mc Graw Hill; 2014; p: 231-240*.
 33. Nicola L Hawley, Carolyn Brown, Ofeira Nu'usolia, John Ah-Ching, Bethel Muasau-Howard, and Stephen T McGarvey. Barriers to adequate prenatal care utilization in American Samoa. *Maternal and Child Health Journal*. 2014 December ; 18(10): 2284-2292.
 34. Liu A, Zhang R, Li Z, Qu P, Zhao Y, Yan H. Zhonghua Liu Xing Bing Xue Za Zhi. [Incidence of low birth weight among single live birth neonates and influencing factors in Shaanxi]. *Zhonghua Liu Xing Bing Xue Za Zhi*. 2015 Nov;36(11):1244-8.
 35. Raushan Alibekova, Jian-Pei Huang, Yi-Hua Chen. Adequate Prenatal Care Reduces the Risk of Adverse Pregnancy Outcomes in Women with History of Infertility: A Nationwide Population-Based Study . *PLoS One*. 2013; 8(12): e84237.
 36. Lawrence M. Kessler, Benjamin M. Craig, Shayne M. Plosker
 37. Damon R. Reed, and Gwendolyn P. Quinn. . Infertility Evaluation and Treatment among Women in the United State. *Fertility and Sterility*. 2013 Oct; 100(4): 10.1016/j.fertnstert.2013.05.040.
 38. Ariane Cristina Ferreira Bernardes, Raimundo Antonio da Silva, Liberata Campos Coimbra, Maria Teresa Seabra Soares de Britto Alves, Rejane Christine de Sousa Queiroz, Rosângela Fernandes Lucena Batista, Heloisa Bettioli, Marco Antônio Barbieri, Antônio Augusto Moura da Silva. Inadequate prenatal care utilization and

- associated factors in São Luís, Brazil. *BMC Pregnancy and Childbirth* 2014;14:266
39. Quaresma ME, Almeida AC, Méio MDB, Lopes JMA, Peixoto MVM. (Rio J). Factors associated with hospitalization during neonatal period. *J Pediatr.* 2017 Sep 22. pii: S0021-7557(17)30067-0. doi: 10.1016/j.jpmed.2017.07.011. [Epub ahead of print]
40. Petousis S, Margioulas-Siarkou C, Kalogiannidis I. Effectiveness of Tocolytic Agents on Prevention of Preterm Delivery, Neonatal Morbidity, and Mortality: Is There a Consensus? A Review of the Literature. *Obstetrical & Gynecological Survey.* 2016 Apr;71(4):243-52.
41. Baisheva NS, Duglas NI, Pavlova TY, Yakovleva EB, Rad YG. Super early premature birth in terms of the new standard of live birth in The Republic Of Sakha (Yakutia). *Wiadomosci Lekarskie - Journals.* 2015;68(4):520-2.
42. Berry MA, Shah PS, Brouillette RT, Hellmann J. Predictors of mortality and length of stay for neonates admitted to children's hospital neonatal intensive care units. *Journal of Perinatology.* 2008 Apr;28(4):297-302. 41- Mashuda F, Zuechner A, Chalya PL, Kidenya BR, Manyama M. Pattern and factors associated with congenital anomalies among young infants admitted at Bugando medical centre, Mwanza, Tanzania. *BMC Research Notes* 2014, 7:195 .
43. Kelly L. Jones and Margaret P. Adam. Evaluation and diagnosis of the dysmorphic infant. *Clinics in Perinatology.* 2015 Jun; 42(2): 243–viii.