

Frequency of Vitamin K Deficiency in Neonates Presenting with Abnormal Bleeding to the Neonatal Unit of A Tertiary Care Hospital

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ABSTRACT

Background: The term vitamin k originated from Koagulations -vitamin in German¹. Vitamin K is a fat soluble vitamin that is absorbed from gastrointestinal tract in the presence of bile salts. Vitamin K is required for the synthesis of coagulation factors, II, VII, IX, X by liver². Because of the short half life of these factors, and the small amounts of vitamin K stored in the body, the inadequate intake of vitamin K can result in its deficiency in a short period of time. In the past, all bleeding disorders in the newborn were grouped together, under the diagnosis of hemorrhagic disease of the newborn (HDN).

Aim: To determine the frequency of vitamin K deficiency in neonates presenting with abnormal bleeding to the neonatal unit of a tertiary care hospital.

Results: While studying the distribution of cases by age it was found that 45(12%) were between 1-24 hrs of age, 185(49.3%) were found between 2-7 days of age and 145(38.6%) were found to be between 1-2 weeks of age, 237(63.2%) were found to be male and 36.8% were found to be female. According to the geographical areas (urban and rural) was discussed. Amongst the total of the 375 cases 168(44.8%) came from the urban areas and 207(55.2%) came from rural areas. The frequency of the deranged clotting profiles of the cases, 369(98.4%) of the patients had a deranged coagulation profile and 6(0.01%) had a normal clotting profile. The frequency of the deranged platelet count in neonates presenting with bleeding 362(96.5%) had a normal platelet count and 13(0.03%) had a deranged platelet count. 352(93.8%) had vitamin k deficiency bleeding and 23(0.06%) had bleeding disorders other than vitamin k deficiency bleeding.

Conclusion: Vitamin k deficiency bleeding is a very important cause of bleeding in the first month of life. It is more common in the male gender and in the rural population. Vitamin k deficiency bleeding is a preventable cause of bleeding, hence vitamin k prophylaxis should be made mandatory at birth for all newborn babies.

Keywords: Frequency, vitamin k deficiency bleeding

INTRODUCTION

The term vitamin K originated from Koagulations-vitamin in German¹. Vitamin K is a fat soluble vitamin that is absorbed from gastrointestinal tract in the presence of bile salts. Vitamin K is required for the synthesis of coagulation factors, II, VII, IX, X by liver². In the past, all bleeding disorders in the newborn were grouped together, under the diagnosis of hemorrhagic disease of the newborn (HDN). The new term for hemorrhagic disease of the newborn is vitamin K deficiency bleeding (VKDB). Nowadays methods are available for the accurate diagnosis of factor deficiency states and immune thrombocytopenia. Vitamin K Deficiency Bleeding can be distinguished from other disorders by exclusion, and on seeing the patient's response following the administration of 1 mg I/M injection Vitamin K³.

Vitamin K deficiency can cause bleeding in an infant in the first weeks of life. This is known as

Hemorrhagic Disease of the Newborn (HDN). Vitamin K is commonly given prophylactically after birth for the prevention of HDN, but the preferred route is uncertain.

The classic onset of vitamin K Deficiency Bleeding is 2-7 days after birth in breast fed infants. Classical VKDB is defined as bleeding occurring from the 2nd to 7th day after the birth. This is seen more commonly in babies whose feeding is delayed in the first few days of life, either because their feeding is infrequent for some reason, (for example they are sleepy from the effects of a Pethidine injection administered to the mother for pain relief in labour), or feeding is not possible because the baby is unwell in the intensive care nursery. If the baby does develop Classical VKDB, excessive bleeding can occur around the baby's cord site (although a small amount of bleeding is not uncommon as the cord separates).

Bleeding in the baby's brain is the main concern of VKDB, as this can lead to varying degrees of brain damage and in rare cases death of the baby. The

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incidence of Classical VKBB is thought to range from about 0.44% in well babies, up to 1.5% if the baby is unwell.

The administration of vitamin K at birth will of course reduce the morbidity of bleeding and its complications in this particular age group. However the parental refusal of prophylaxis and increasing frequency of breast feeding may cause a resurgence of Vitamin K Deficiency Bleeding.⁴

We planned this study to determine the frequency of vitamin K deficiency in neonates presenting with abnormal bleeding to the neonatal unit of a tertiary care hospital.

MATERIALS AND METHODS

A total of 375 neonates presenting with bleeding while Neonates having an obvious cause of bleeding diathesis for example anti-coagulant therapy were excluded from the study. It was a Cross-sectional survey conducted at Department of Hematology and Transfusion medicine, The Children's Hospital and Institute of Child Health, Lahore.

Data Collection Procedure: The study was approved by the ethical committee of the Children Hospital and the Institute of Child Health Lahore. In this study 375 cases of neonates, presenting with bleeding, and fulfilling the inclusion and exclusion criteria were taken over a period of six months, both from the neonatology department, indoor ward and the out patient department of the neonatology unit of The Children hospital and the Institute of Child Health Lahore. After taking informed consent, the mandatory investigations were performed, including the CBC,(complete blood count) for platelet count and PT(Partial thromboplastin),APTT(activated partial thromboplastin time), to determine coagulopathy. An informed consent was taken from the parents of all patients included in the study. The CBC was done by collecting 3ml of blood by venipuncture and anticoagulated with EDTA(Ethyl-di-amine tetra acetic acid), under strict aseptic techniques. The samples were then processed by sysmex kx-21. While PT and APTT were done manually according to the SOPs(Standard operating procedures) of the laboratory. Bleeding time from the neonates was done by capillary puncture using Ivy's Method, under strict aseptic techniques. A blood pressure cuff was wrapped around the upper part of the arm of the patients and was inflated upto 40 mm of Hg. The volar aspect of the forearm was cleaned with a spirit swab and three small puncture wounds were made with the help of a lancet. The blood that oozed out from these small puncture wounds was blotted with a filter paper every 30 seconds. The time for the bleeding to stop was recorded using a stop watch.

Patients with abnormal bleeding, a prolonged PT and APTT and a normal platelet count and bleeding time were given Vitamin K therapy in a dose of 1 mg I/M injection. Response to Vitamin K therapy was assessed by a reduction in intensity or complete cessation of bleeding after 24 hours. The data was entered in a computer and statistically analysed using SPSS-12

RESULTS

A total of 375 neonates fulfilling the inclusion and the exclusion criteria to were enrolled to determine the frequency of vitamin k deficiency bleeding in neonates presenting to the neonatology department of a tertiary care hospital. The data was collected by a specially designed proforma.

Distribution of cases by age was computed in table no. 1 and it was found that 45(12%) were between 1-24 hrs of age, 185(49.3%) were found between 2-7 days of age and 145(38.6%) were found to be between 1-2 weeks of age. Mean age was 8.52+/- 2.14

Gender distribution of the subjects was computed in table 2, where 237(63.2%) were found to be male and 36.8% were found to be female, with a male to female ratio of 1:05 Gender distribution in different age groups was discussed in table no. 3. It showed that between 1-24hrs of age 29(64.4%) were male and 170(37.7%) were female with a male to female ratio of 1.7:1. Gender distribution between 2-7 days of age was as follows. 110(59.4%) were male and 75(40.5%) were female with a male to female ratio of 1.4:1

Gender distributions between 1-2 weeks of age was as follows, 97(66.8%) were male, 48(33.1%) were female with a male to female ratio of 2.02:1

In table distribution of cases according to the geographical areas(urban and rural) was discussed. Amongst the total of the 375 cases 168(44.8%) came from the urban areas and 207(55.2%) came from rural areas.

Table 5 showed the frequency of decreased PT and APTT of the cases, 369(98.4%) of the patients had a decreased PT and APTT and 6(0.01%) had a normal clotting profile.

Table 6 showed the frequency of the decreased platelet count in neonates presenting with bleeding. 362(96.5%) had a normal platelet count and 13(0.03%) had a decreased platelet count.

Table 7 shows the frequency of vitamin k deficiency bleeding in neonates presenting with abnormal bleeding to the neonatal unit of a tertiary care hospital. 352(93.8%) had vitamin k deficiency bleeding and 23(0.06%) had bleeding disorders other than vitamin k deficiency bleeding.

Table 1: Distribution of cases according to different age groups. (n=375)

Age Groups	n	%age
1-24 hrs Early VKDB	45	12
2-7 days Classic VKDB	185	49.3
1-2 wks Late VKDB	145	38.6

Mean age+S.D 8.52 + 2.14

Table 2: Distribution of data according to gender.

Gender	n	%age
Male		63.2
Female	138	36.8

Male :Female ratio=1:0.5

Table 3: Male to female ratios in different age groups

Gender	1-24 hrs	2-7 Days	1-2 Weeks
Male	29(64.4%)	110(59.4%)	97(66.8%)
Female	17(37.7%)	75(40.5%)	48(33.1%)
Male: Female	1.7:1	1.4:1	2.02:1

Table 4: Distribution of cases according to the geographical areas.

Geographical Area	n	%age
Urban	168	44.8
Rural	207	55.2
Total	375	100

Table 5: Frequency of increased and normal PT and APPT in children presenting in the neonatal unit with complaint of bleeding.

PT & APPT	n	%age
Yes (Increased)	369	98.4
No (normal)	06	0.01

Table 6: Frequency of normal and decreased platelet count in neonates presenting with bleeding.

Platelet count	n	%age
Normal	362	96.5
Decreased	13	0.03
Total	375	100

Table 7: Frequency of VKDB in neonates.

Vitamin K Deficiency	n	%age
Yes	352	93.8
No	23	0.06
Total	375	100

VKDB= vitamin K deficiency bleeding

DISCUSSION

Vitamin K deficiency may cause unexplained bleeding during the first week of life in a previously healthy appearing neonate. Late VKDB, a syndrome defined as unexplained bleeding attributable to severe vitamin K deficiency in infants 2-6 weeks of age, occurs primarily in exclusively breastfed infants who have received no or inadequate neonatal vitamin K prophylaxis.

The age at presentation of VKDB varies according to different reports. It has been found to be 34 days in one report.⁵ The result of the current study shows that the age of presentation of VKDB was 8.52 days, which is the average age for all the three types of VKDB i.e., early (1-24 hrs) classic (1-7 days), and late VKDB (1-2 wks). The mean age at onset was 51.65 days in a local study⁶. Similarly another study showed the age to be 20.4+/-4.9 days⁷, Another research paper showed the mean age to be 30 days⁸.

A study was conducted by Van Hasselt PM, de Koning TJ et al that showed that the female gender was at a higher risk of having VKDB. However the current study showed that males were at a higher risk. The males being 237(63.2%) and the females being 138(36.8%) and the male female ratio being 1:0.5. The same association of male predominance was also shown by another study conducted in the Hanoi province of Vietnam⁹. An Ethiopian study conducted in Adis Ababa showed the male to female ratio to be 1.8:1.¹⁰ The paediatric medicine department of Nishtar Hospital, Multan conducted a study from 2004 to 2006 which showed the male predominance prevailed like the current study with the male female ratio being 2.1:1¹¹. A German study also showed that the male gender was effected more than the female gender¹².

It has been noticed in previous research work done on VKDB that the rural population suffered more from VKDB, maybe because of home deliveries and inability to receive vitamin K at birth.⁹ The same finding was observed in the present study. A study conducted in Kelantan Malaysia also showed the same result of having more patients belonging to the rural areas, the reason being the trend of home deliveries amongst the rural population¹³.

The PT and the APTT of patients suffering from VKDB is usually raised, an Egyptian study conducted in 2004 also showed that the PT and APTT were raised before the administration of Injection Vitamin K, and returned within the normal reference range after the administration of I/M injection vitamin K⁷. The same results were also observed in the current study. In 369(98.4%) of the cases the PT and the APTT were raised and in 6(0.01%) of the cases the PT and the APTT were found to be normal.

The platelet count in VKDB is almost always within the normal reference ranges of 150-450x10⁹/L three studies that conducted research on VKDB, all had a normal platelet count of 150-450x10⁹/L in their inclusion criteria's^{7,10,12} as did the present study. 362(96.5%) of the patients had a normal platelet count and 13(0.03%) had a decreased platelet count.

The frequency of VKDB was known to be 2.21% in a local Pakistani research paper published in

2001, however this frequency was calculated on the basis of the overall modes of admission of neonates in a neonatal unit¹⁴.

Another study that calculated only the frequency of early VKDB, which occurs within the first week of life, showed the frequency to be 0.25-1.7%¹⁵.

The present study calculated the frequency of VKDB to be 352(93.8%), however this frequency is slightly higher than all the other studies, reason being that this frequency was calculated amongst children presenting with bleeding disorders.

However it must be kept in mind that in the present study, the frequency of VKDB has been calculated in all the three subtypes of VKDB, and not separately in all the three sub types.

CONCLUSION

Vitamin k deficiency bleeding is a very important cause of bleeding in the first month of life. It is more common in the male gender (63.2%) and in the rural population (55.2%). The Present study shows the frequency of Vitamin K deficiency bleeding to be 93.8% in neonates presenting with bleeding, and the mean age was found to be 8.5 days. Vitamin k deficiency bleeding is a preventable cause of bleeding, hence vitamin k prophylaxis should be made mandatory at birth for all newborn babies.

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