Newborn Screening in Bangladesh

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Abstract

Newborn screening started in Bangladesh in 1999. The programme started as part of a regional project of the International Atomic Energy Agency (IAEA) to screen for congenital hypothyroidism (CH). In the beginning the IAEA helped the country with equipment, filter papers, reagents, training and expert services. Since 1999, 2 pilot projects to screen newborns for CH were completed. Under these projects some 30,000 newborns were screened and 16 were identified with hypothyroidism. The government of Bangladesh approved a national project in July 2006 to screen newborns in some selected areas of the country for CH. Under the project some 200,000 newborns will be screened and laboratory facilities for newborn screening will be increased. Bangladesh has a large population of about 140 million. With the current birth rate some 2 million new births take place every year. The socio-economic situation of the country is also different. Per capita income of the country is one of the lowest in the world. About 85% of babies are still delivered at home. As such newborn screening is a big challenge for Bangladesh. However, the country is trying to overcome these challenges.

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Introduction

Bangladesh is a small country in South Asia, with an area of 147,570 sq km. However it has a large population of about 140 million. With the current population growth rate of about 1.48%, some 2 million births take place every year. Iodine deficiency is endemic in the country. Goitre and other iodine deficiency disorders (IDD) are very common and are known from ancient times.[1]

In South Asia, priorities for healthcare in children have centred around infectious disease, malnutrition and curative services.[2] Bangladesh's situation is similar, and the country's main challenges in healthcare are childhood problems like malnutrition, diarrhoea and other communicable diseases, with a high infant and child mortality rate. Newborn screening has emerged as a new challenge for the country.[3]

Bangladesh entered into an era of newborn screening in 1999. The programme started as part of an International Atomic Energy Agency (IAEA) Regional Project on Neonatal Screening for Congenital Hypothyroidism in East Asia (RAS/6/032). Initially, it was a great challenge. There was very little knowledge or experience to run such a programme. There was no awareness, no laboratory set-up and no trained manpower for newborn screening.

The Bangladesh Atomic Energy Commission with the support of IAEA started the newborn screening movement in Bangladesh. In the beginning IAEA helped the country with equipment, filter papers, reagents and expert services. IAEA also trained some of our physicians and laboratory people abroad in a few advanced newborn screening centres. The Government of Bangladesh had also a positive attitude towards the programme from the very beginning. Healthcare professionals especially showed a great interest towards the programme and supported it wholeheartedly.

Bangladesh presented their first data on newborn screening in the 4th Asia-Pacific Regional Meeting for Neonatal Screening held in Manila, Philippines in October 2001. The screening programme in the country thus entered into the international arena. At home, to promote newborn screening, a number of motivation and training programmes were attended by physicians, paramedics, policymakers and public representatives.

Due to efforts during the past few years the Government

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Table 1. Summary of Newborn Screening (Congenital Hypothyroidism)

Time period from January 2000 to December 2006	No. of newborn screened	No. of unsatisfactory samples	No. of positive samples	No. of babies recalled	No. of diagnosed cases
Total	31802	1263	438	362	16

of Bangladesh included a project on newborn screening in its Annual Development Programme (ADP) in July 2006. Under the programme about 200,000 newborns from different parts of the country will be screened for detection of congenital hypothyroidism (CH). The project is expected to cost 104 million taka (about US$1.5 million). The project will run up to June 2010.

Materials and Methods

Till now CH was the only condition screened. Screening was done mainly in large hospitals using filter paper. Cord blood was used for sample collection. After collection and proper drying, the samples were sent to laboratories by courier service or messenger. At present the samples are analysed in 6 different laboratories in different parts of the country. The Institute of Nuclear Medicine and Ultrasound situated in Bangabandhu Sheikh Mujib Medical University in Dhaka acts as a central laboratory and coordinates the activities of other laboratories. All the laboratories use the radioimmunoassay (RIA) method. TSH was measured and a value of 20 mIU/ L was taken as a cut-off point. Babies who screened positive were recalled and their serum were analysed for T4 and TSH.

Results

From January 2000 to December 2006 a total of 31,802 babies were screened. The samples were collected randomly from 10 selected hospitals mostly located in Dhaka city as well as some other parts of the country. Some 321,000 babies were born in the same period in these hospitals. It meant that more than 289,000 babies were not screened, thus screening coverage was only 9.9%. One thousand two hundred and sixty-three (4.0%) samples were found to be unsatisfactory due to various reasons and were rejected. In 438 samples (1.4%), TSH levels were more than 20 mIU/ L. Unfortunately only 362 babies (1.1%) could be recalled. Sixteen babies were eventually confirmed to have CH (Table 1). This gave an estimated prevalence of about 1 in 2000 newborns.

Discussion

Newborn screening began in the 1960s with the work of Robert Guthrie, a researcher in USA and widely recognised as "father of newborn screening". Guthrie and Susi[4] developed a bacterial inhibition assay (BIA) for phenylalanine in order to detect phenylketonuria (PKU), an inborn error of metabolism which causes severe mental retardation. Since then, newborn screening programmes have been adopted by most of the developed countries. However, the scenario in developing nations is different. In countries with depressed and developing economies, particularly in Africa and Asia, newborn screening is either not yet a priority or is just emerging as a priority.[5] Bangladesh is a developing country with many other problems. The universal newborn screening programme is a highly ambitious project for a country like Bangladesh.[6]

Increased global awareness has resulted in new national newborn screening programmes in South Asia. Bangladesh and some other countries in South Asia entered into a new era of newborn screening with the initiation of an International Atomic Energy Agency (IAEA)-sponsored regional project on neonatal screening for CH in 1999.

Congenital hypothyroidism is a treatable condition and a child can be saved from severe mental and physical retardation if detected and treated in first few weeks of life. Iodine deficiency is also endemic in Bangladesh and the prevalence of iodine deficiency disorders (IDD) is high.[7] For these reasons, Bangladesh is making it a priority to screen for CH.

The preliminary prevalence of CH in Bangladesh is about 1 in 2000 newborns which is higher than other published results.[8,9] However, for a country with a high incidence of iodine deficiency this was probably not unexpected. The actual prevalence rate may well be much higher.

A developing newborn screening programme in Bangladesh faces many problems. The socio-economic situation is a big barrier. More than 85% of deliveries occur at home and it is very difficult to bring them under the programme. Out of 438 newborns who were screened positive, only 362 could be contacted. Others did not have a complete contact address or any phone number. Some people gave their old addresses. However, now sample collectors are more particular in recording details of the contact address and the number of lost cases is getting fewer now. Similarly in the beginning, we had to reject a good number of samples as they were found to be unsatisfactory. Now healthcare providers are more trained in collection of samples and the number of unsatisfactory samples is now negligible.

The country still lacks an official policy for newborn

screening. That is one of the greatest weaknesses of our programme. Healthcare professionals are working to integrate newborn screening into the healthcare system of the country. Obtaining funds for screening 2 million babies per year is also a big hurdle. It is hoped that once the government formulates a policy that some donor agencies will make funds available. Bangladesh has a successful extended immunisation programme with a coverage rate of more than 90%. Perhaps neonatal screening can be modelled after this.

Conclusion

Newborn screening is a challenging programme for Bangladesh. The activities of the past few years have created a platform for the growth of future newborn screening programme in the country. It is hoped that at the end of the current national project in June 2010 the government will adopt a policy on newborn screening and it will become a sustainable programme in Bangladesh.

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