

A STUDY OF ROLE OF VITAMIN B FACTORS IN THE REGENERATION OF INJURED PERIPHERAL NERVES

Dr. Archana Saxena

Associate Professor, Department of Home Science, A.N.D Girls P.G. College, Kanpur, Uttar Pradesh, India

Abstract

Vitamin 'B' complex plays a crucial role in maintaining the functioning of the Nervous system, especially Thiamin (B1), Pyridoxine (B6) and cyanocobalamin (B12). The present study aims to assess the role of these B vitamin in the regeneration of injured nerve injury and for this purpose patients with peripheral nerve injury were admitted to B.H.U hospital were selected as sample. 30 of the sample were administered with vitamin B1, B6 and B12 along with medication and 30 of the samples were not given any supplement of B1, B6 and B12 vitamin.

Collected data were analyzed statistically and it was found that the problem of injured nerves was equally common in all age groups, as there is an increasing incidence of accidents every day.

These peripheral nerve injuries are usually missed due to over-attention to manage skin, bone, and muscle injuries and casual examination of nerves.

Keywords: *Nerve regeneration, Neural regeneration, Vitamin B12,*

INTRODUCTION

Peripheral nerves are a part of the peripheral nervous system which comprises of 31 pairs of spinal nerves and 12 pairs of cranial nerves. These nerves are composed of sensory nerve fibers conveying impulses from sensory and organs to the brain, and motor nerve fibers conveying impulses from the brain through the spinal cord to the effector or organs, e.g., skeletal muscles, smooth muscle and glands.

Vitamins are the organic compounds occurring in small quantities in the different natural foods and are necessary for the growth and maintenance of good health in human beings.

Vitamin B₁, B₆ and B₁₂ are known to help in the normal functioning of the nerves. Deficiency of these produces degeneration of nerves. Deficiency of the vitamin B₁₂ causes in about 80 percent of the cases, numbness and tingling in fingers and toes.

According to Altun, T and Kurutas, E.B (2016) the emphasis has been given to reveal the association of vitamin B complex in the recovery of peripheral neuropathy along with regeneration of nerves, based on the clinical studies. Various studies also show that supplementation of vitamin B especially in the acute injuries plays an important role in recovery of nerves function as well as enhanced the nerve generation in animals.

There is no question that the peripheral nervous system possesses a remarkable potential for regeneration. There are various multiple factors that influence the repair of injured peripheral nerve. The role of Nerve Growth factors i.e. B₁, B₆, and B₁₂ in the survival, growth and differentiation of peripheral nerves is well documented in therapeutic world.

keeping the above fact in mind, this topic was selected for study, to see, what role vitamin B factors or Nerve growth factors play in the regeneration of the injured peripheral nerves, when these are administered into the patient either orally, intravenously or intramuscularly. Patients are given these B complex factors regularly and their recovery is checked from time to time to see how far the lost sensation recovered and is there any increase in the type and quality of this sensation.

METHODOLOGY

The present study is based on the observations on cases of peripheral nerve injuries of different sites. It is based on the evaluation of the progress of the patients after the operation, through follow-up studies by using various methods in the unit of reconstructive microsurgery of the Division of Plastic Surgery of the Department of Surgery, Institute of Medical Sciences, B.H.U.

Selection of Area and Sample:

Patients with peripheral nerve injury who were admitted in the ward were selected for study. History and clinical examination of the patient was recorded on the Performa. As sample size, 60 patients were purposely selected out of which 30 classified as control and 30 patients as study group. Control group patients had medication without neurotrophic factor (Vitamin, B Therapy) where as patients in study group were prescribed some neurotrophic factor.

Sample-Design:

A sample of 60 patients were selected for the study, Out of which 30 case retrospective study was done and other 30 cases prospective study. In the prospective sample, each alternate patient was prescribed some Neurotropic factor, so as to check the progress of the patients with the neuro tropic factor and of the patients without neurotrophic factors. and in the retrospective study it was presumed that all the 30 patients were given neurotrophic factors.

Tools and Techniques:

Questionnaire cum interview method was used to collect information The observation of patient's report of electromyography was made to assess the regeneration of nerves.

Collection of Data:

A total number of 60 samples were collected. In prospective study the patients were given Neurotropic factors alternatively. The data collected were tabulated by the manual tally marks and then analyzed with the help of simple statistical techniques

RESULTS

The present study is based on the findings of 60 cases (30 prospective and 30 retrospective) of Peripheral Nerve Injuries with or without special nutritional support in the form of Neurotropic vitamins. The findings of the investigation are as follows.

All the cases of peripheral nerve injuries referred to microsurgery outpatient which runs twice a week; in the outpatient department of S. S. Hospital have been included for the present work, which has been 60 in total 30 retrospective, and 30 prospective. This does not indicate the exact incidence of peripheral nerve injuries in the community, since the cases are managed outside by other Surgeons.

Table 1.1 Distribution of Sample According To Age

| S. No. | Class Interval | No. of cases | Percentage |
|--------|--------------------|--------------|------------|
| 1. | Less than 10 years | 07 | 11.66 |
| 2. | 10 20 years | 18 | 30 |

| | | | |
|----|--------------|-----------|------------|
| 3. | 20-30 years | 22 | 36.66 |
| 4. | 30-40 years | 10 | 16.66 |
| 5. | 40-50 years | 03 | 05 |
| | Total | 60 | 100 |

Table (1.1) shows the age distribution of patients who underwent different plastic surgery reconstructive procedures. Looking at the table carefully it appears that patients I have been seeking consultation in all the age-group.

Table 1.2 Distribution of Sample According To Sex

| S.No. | Particulars | No. of Cases | Percentage |
|-------|--------------|--------------|------------|
| 1. | Male | 51 | 85 |
| 2. | Female | 09 | 15 |
| | <u>Total</u> | <u>60</u> | <u>100</u> |

In sex distribution Table 1.2 shows preponderance of the males (51 i.e. 85 percent) over females.

Table 2.1 Distribution of sample according to the mode of Injury

| S.No. | Particulars | No. of Cases | Percentage |
|-------|---------------------|--------------|------------|
| 1. | Cut Injury | 26 | 43.33 |
| 2. | Gun Shot | 12 | 20 |
| 3. | Blast Injury | 03 | 05 |
| 4. | Road-accident | 06 | 10 |
| 5. | Volkman-Contracture | 02 | 03.33 |
| 6. | Others | 11 | 18.33 |
| | | 60 | 100 |

Looking at the mode of injury of these patients, it has been observed that majority of cases (26) i.e. 43.33 percent has cut injury, 12 cases i.e. 20 percent had injury by Gun-shot, 10 percent met with Road accident, 2 cases had injury by V.I.C., and others in which each by Stale and Glass splint injury. 9 cases percent had injury through electrical shock in fights, through sharp cutting instruments post injection injury etc.

Table 2.2 Distribution of Sample according to the type of Nerve involved

| S.No. | Particulars | No. of Cases | Percentage |
|-------|---------------------------------|--------------|------------|
| 1. | Ulnar | 24 | 40 |
| 2. | Median Nerve | 10 | 16.66 |
| 3. | Radial Nerve | 03 | 05 |
| 4. | Combined Ulnar and median Nerve | 12 | 20 |
| 5. | Common Peroneal Nerve | - | - |
| 6. | Sciatic Nerve | 02 | 03.33 |
| 7. | Digital | 02 | 03.33 |
| 8. | Post Interosseous | 01 | 01.66 |
| 9. | Lateral Popliteal N. Injury | 04 | 06.66 |
| 10. | V.I.C. | 01 | 01.66 |
| 11. | Brachial Plexus | 01 | 01.66 |
| | Total | 60 | 100 |

Looking at the table, it is evident that maximum cases are that of ulnar nerve injury, then are the cases of combined ulnar and median nerve injury, Radial nerve involvement was not much. Brachial-plexus, Sciatic, Post-interocceous, V.I.C. were not too common.

Table 3.1 Distribution of sample according to the recovery in Sensory and Motor power in Follow up Clinic.

Table – 3.1: Follow-up of Radial Nerve Injury Patients

| Case No. | Date of Operation | 03 Months | 06 Months | 09 Months | 12 Months | 15 Months | 18 Months |
|----------|-------------------|-----------|----------------|-----------|-----------|-----------|-----------------------------|
| 3 | 27.01.14 | - | - | - | - | - | Sensory 80% Motor Normal |
| 25 | 19.05.16 | M+ S+ | M+ S-Normal | | | | |

Radial nerve (Table 03.1) in first 03 months only one case attended the follow up clinic in whom there were signs of only sensory recovery. At 06 months sensory improvement was almost full and there was progressive motor improvement (Case No. 25). Same case at one year of follow up was found to have normal motor function and sensations. The other case of radial nerve injury was seen at 16 months interval and had about 80% sensations with normal motor function.

Table 3.2 Follow up of Median Nerve Injury Patients

| Case No. | Date of Operation | 03 Months | 06 Months | 09 Months | 12 Months |
|----------|-------------------|------------------------------------------------------------------|-----------|-----------|-----------|
| 19. | 14.03.16 | - | - | - | - |
| 20. | 28.03.16 | - | - | - | - |
| 26. | 14.11.16 | 14.12.14 Sensory (+) Motor (-) 25.01.16 Sensory (+) Motor (-) | - | - | - |
| 30. | 28.09.16 | Hyperesthesia (-) | - | - | - |
| 16. | 15.02.16 | Sensory (-) Motor (-) | - | - | - |

Out of 5 cases of median nerve 3 patients came in follow up clinic. At first 3 months two cases with cut injury had sensory recovery. The one who had hyperesthesia became normal after neurolysis. One case with electric burn had no sensory or motor recovery (Case No. 16).

Table 3.3 Follow up of Ulnar Nerve Injuries

| Case No. | 03 Months | 06 Months | 09 Months | 12 Months | 32 Months |
|----------|--------------------------|-----------|-----------|--------------------------|--------------------------|
| 1. | - | - | - | - | Sensory (+) Motor (+) |
| 4. | - | - | - | - | - |
| 9. | - | - | - | - | - |
| 10. | Sensory (+) Motor (+) | - | - | Sensory (+) Motor (+) | - |
| 11. | - | - | - | - | - |
| 12. | Sensory (+) Motor (+) | - | - | - | - |
| 15. | - | - | - | - | - |
| 28. | - | - | - | - | - |
| 29. | - | - | - | - | - |
| 23. | - | - | - | - | - |

Ulnar Nerve Table 3.3

Two patients with ulnar nerve injury came in first 3 months for follow up. There was sensory improvement of about 25% and motor improvement in the form of improvement in wasting clawing was present. One case at 32 months of repair had only about 25% of sensory improvement but he had marked motor improvement (Case No. 1) but still claw hand was present.

Recovery of Case No. 21

In first 3 months neither sensory nor motor improvement was noticed. At 6 months Tinel sign was positive only at the site of scar suggesting obstruction in conduction. This was also confirmed by nerve conduction studies (Case No. 21).

Table 3.4 Follow up of Radial Nerve Injury Patient

| Case No | 03 Months | 06 Months |
|---------|--------------------------|-----------------------------|
| 41 | Sensory (+) Motor (-) | Sensory Normal Motor (-) |
| 52 | Sensory (-) Motor (-) | Sensory (+) Motor (-) |
| 53 | Sensory (-) Motor (-) | Sensory (+) Motor (+) |

Out of 3 cases of Radial nerve all came in follow up clinic. At first 3 months Sensory recovery was found 3 months, in case 41 only and it became normal after 6 months. Case 52 and 53 had no sensory recovery and Motor recovery at 3 months ,but sensory recovery occurred in case 52 while in case 53 both sensory and motor recovery developed. Out of the 3 cases, case 41, and 52 were given Vitamin B factors.

Table 3.5 Follow up of Median Nerve Injury Patients

| Case No | 03 Months | 06 Months |
|---------|--------------------------|--------------------------|
| 31 | Sensory (+) Motor (-) | Sensory (+) Motor (-) |
| 34 | Sensory (+) Motor (-) | Sensory (+) Motor (+) |
| 46 | Sensory (-) Motor (-) | Sensory (+) Motor (-) |
| 49 | - | - |
| 59 | Sensory (-) Motor (-) | Sensory (+) Motor (-) |

Out of 5 cases of Median nerve injury only 4 attended the follow up clinic. Case No. 31 and 34 had sensory recovery at 3 months, while motor recovery was negative, while at 6 months sensory and motor recovery occurred in case 34. In case 46 and 59 sensory and motor recovery was negative at 3 month while sensory improvement was seen in both the cases at 6 months, while no motor improvement was seen. Case no. 31, 49 and 59 were given vitamin B factors and case 34 and 36 were not given N.G. Factors.

Table 3.6 Follow up of ulnar Nerve Patients

| Case No | 03 Months | 06 Months |
|---------|--------------------------|---------------------------------|
| 32 | Sensory (+) Motor (+) | Sensory (-) Normal Motor (+) |
| 35 | Sensory (-) Motor (-) | Sensory (+) Motor (+) |

| | | |
|----|--------------------------|--------------------------|
| 37 | - | - |
| 38 | Sensory (+) Motor (-) | Sensory (+) Motor (-) |
| 39 | Sensory (+) Motor (+) | Sensory (+) Motor (+) |
| 43 | - | - |
| 45 | - | - |
| 50 | - | - |
| 51 | Sensory (-) Motor (-) | Sensory (+) Motor (-) |
| 54 | Sensory (+) Motor (-) | Sensory (+) Motor (-) |
| 56 | - | - |

Out of 12 ulnar nerve cases, only 7 came for follow up. In case 32, 35 and 39 sensory and motor recovery both was seen. In cases 38, 51 and 55 was sensory recovery but no improvement in motor power. In case no. 54 no recovery in either motor or sensory power was seen. Case no. 38, 51 and 55 were not given neurotropic factors.

Table 3.7 Follow up of Lateral Popliteal Nerve

| Case No | 03 Months | 06 Months |
|---------|--------------------------|--------------------------|
| 36 | - | - |
| 47 | Sensory (-) Motor (-) | Sensory (-) Motor (-) |

Out of 2 cases of lateral popliteal nerve only 1 attended the follow up clinic. At 3 and 6 months, no sensory or motor power recovery was seen. Patient was not given any neurotropic factor.

Table 3.8 Follow up of V.I.C

| Case No | 03 Months | 06 Months |
|---------|--------------------------|--------------------------|
| 58 | Sensory (+) Motor (-) | Sensory (+) Motor (-) |

The patient developed sensory recovery at 3 months, but no motor recovery was seen either at 3 and 6 month. The patient was given neurotropic factory.

Table 3.9 Follow up of Brachial Plexus

| Case No | 03 Months | 06 Months |
|---------|--------------------------|--------------------------|
| 60 | Sensory (-) Motor (-) | Sensory (-) Motor (-) |

The patient neither developed any sensory nor motor power, either at 3 month or 6 month. The patient was given neurotropic factors.

CONCLUSION

Most of the times use of vitamin B factor as such is conventional and empirical, because it is not exactly possible to assess the amount of vitamin B factors absorbed and metabolished and reaching at the target site of the repaired nerve. Some workers have also tried the use of various types of Nerve growth factors both systemically as well as topically and have shown that it does help in regenerating process. Thus from the study it was seen that the vitamin

B factors being neurotropic vitamins might help in the regenerating process but it is very difficult to prove it scientifically.

Scientifically, as the reveals of review studies it is proved the role of Vitamin B1, B6 and B12 especially from B complex works as neuroactivator, transmitters and formulator and neuroprotector. But its supplementation based clinical studies cannot be clarified it sparely.

Therefore further experimental in Vito and in vivo studies with particular vitamin B and combination are needed.

Male preponderance is significant over females as more males are involved in farm work, in industries than the females. Most of the injuries were due to cuts, Gunshot, sharp cutting instruments etc.

Median and ulnar nerves are involved more than other nerves. Next incidence is those of combined Median and ulnar nerve. It was very difficult to evaluate objectively the role of vitamin B factors in the regeneration of injured peripheral nerves, because of the random pattern of the disease with very few cases of exactly identical nature, and the methods of estimation of neurovitamins at the injured nerve level is not practical. In the present situation therefore it is mostly an empirical use of Neurovitamins which is practised by most of the treating surgeons, presuming their role in the regeneration of nervous tissue.

SUGGESTIONS

Based on the results of the study and review of literature recommendation are outlined under the following points:

(1.) The need for carrying out many such studies at local level cannot be overemphasized because of the fact that wide diversities in socio-economic, cultural, ethnic, environmental, nutritional and other factors exist in different parts of this vast and variegated country. All data should however be standardized.

(2.) In this study regular NCV conductions were not done, and N.C.V. conductions could not be done in all the patients in the follow up. It is therefore advised that at regular intervals electro diagnostic studies of patients must be done so as to know the level of sensations reached.

(3.) Dietary factors should also be taken in account to see the effect of proper vitamin B factors intake in injured peripheral nerve.

(4.) Due to scarcity of beds, patients were discharged soon hence proper investigation could not be done, thus it is recommended that beds be increased so as to enable a long duration study.

(5.) Patients must be made aware of the importance of physiotherapy in the regeneration of nerves.

(6.) Nutritional education programmes should be promoted along with the rehabilitation.

REFERENCE

1. Altun,I, Kurutas E B (2016), Vitamin B Complex and Vitamin B12 Levels after peripheral nerve injury, Neural Regeneration; 11 (5): 842-845.
2. Andeeea R, Oana S, Raducan AS, Danina M, R. Lighezan. Morphological and functional
3. Aspects of Sociatic Nerve regeneration after crush Injury. 2013; 54: 735-739.
4. Bridge PM, Ball DJ, Mackinson SE, Na Kaoy, Brandt K (1994), Nerve Crush injuries a model for axonotmesis. Exp. Neural 127: 284-290
5. Coleman, C.C, Peripheral nerve surgery Dignostic consideration, J. Newwsurgery, 1991, 178-215.
6. Cornne G. Jolivatt et.al (2009). B Vitamins alleviate indices of neuropathic pain in diabetic rate: Eur J Pharmacol. : 612 (1-3): 41-7.
7. Hobbenaghi R, Javan Bakht. J., Hosseini, E. et. Al (2013) Neuropatological and neuroprotective features of Vitamin B12 on the dorsal spinal ganglion of rate after the experiment crush of sciatic nerve: an experimental study, Diagn. Pathol. 8:123.
8. Richard J. and Zienouriz (1991), A multivariate approach to the treatment of peripheral nerve transaction injury, PRS. 87 (1) : 122-129.

9. Sanchez Ramirez G.M, Caram Sales N L, Rocha: - Gonzalz,, Roberto Medina, Gerardo Reyes-Garcia, V G Soto: Benfortiamine relieves inflammatory and neuropathic pain in rate European Journal of pharmacology 530 (1-2), 48-53, 2006.
10. Terzis, J.K. and Smith (1991), Principales, practices and techniques of peripheral nerve surgery

