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A Short Report on Decompression Sickness Incidents in Andaman and Nicobar Islands

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Abstract

Objectives: Due to presence of extensively fascinating coral reef ecosystem in the continental shelf of Andaman and Nicobar Islands, people from all over the world visit these islands of India to indulge in recreational diving. An increased participation figure has also elevated the number of divers at risk for Decompression Sickness (DCS). Despite this, no scientific data are available on DCS incidents from India. Present study is aimed to evaluate the DCS incidents reported in these islands, treatment provided, and the outcome of the treatment. An attempt has also been made to calculate the approximate frequency of DCS in comparison to the participation figure. Methods: Study design is retrospective data analyses of a recompression chamber. Naval Diving Unit Port Blair has the only active decompression chamber available in the islands, and Govind Ballabh Pant Hospital Port Blair was used to collect information on DCS incidents that occurred during the mentioned period. Due to lack of authenticated generalized documents of divers' health history and dive logs, the scanty information was gathered from the dive centres on the basis of personal interviews/communications among the SCUBA diving instructors. Results: A total of nine cases were reported during the span of last four and half years, and thus approximate frequency of DCS in Andamans was 0.2/10000 divers year. All of the patients recovered completely after receiving the Hyperbaric Oxygen Therapy (HBOT), with no residual symptoms. Conclusions: Incident rate of DCS in Andamans is lower than that in many other parts of the world; possible reason could be underreporting of less severe DCS cases. During the study period, the number of DCS type II incidents presented for the treatment was higher than that of DCS type I incidents. HBOT proved a complete success in treating DCS cases in the island.

Keywords

Decompression Sickness, SCUBA Diving, Andaman and Nicobar Islands, India

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1. Introduction

Decompression sickness, a dreaded condition for divers all over the world, is one of the four major pathologies associated with diving apart from Barotraumas, Pulmonary Oedema, and toxic effects of gases on increased partial pressure [1] [2]. It is caused by the release of inert gas bubbles (usually nitrogen) in tissues, after ambient pressure is reduced [3]-[6]. Decompression sickness is traditionally classified as type I and type II in 1960 for compressed air workers and later adopted for diving and altitude exposure with some modifications [7]. Type I DCS refers to "pain only" without the involvement of central nervous system and manifests in mild symptoms such as musculoskeletal or joint pain, and skin rashes, while type II involves the presence of bubbles in Central Nervous System (CNS), thus has more serious implications and could result in paraplegia, loss of bladder control or even death [8]. Most frequent symptoms of decompression sickness are shoulder pain, tingling, vertigo, and skin rashes [9]. First aid treatment for DCS is to administer one hundred percent oxygen and definitive treatment is recompression to increased pressure [10].

Sport of Self Contained Underwater Breathing Apparatus (SCUBA) diving is relatively new to India but has shown tremendous growth in past few years and likely to grow further. However, recompression chamber facility in Andaman and Nicobar Islands, which provides Hyperbaric Oxygen Therapy (HBOT) to the DCS patients, is available only with Clearance Diving Unit (CDU) of Naval Diving Unit Port Blair. Any civilian cases are first presented to G.B. Pant Hospital, Port Blair and then referred to CDU, if required.

Andaman and Nicobar Islands, with many active dive centres, are becoming a popular dive destination among the divers around the world [11]. Thus, the number of divers at risk for decompression sickness is also increasing; yet no scientific studies have been performed on decompression sickness incidents in the islands. Present study is the first insight into the DCS incidents that are reported in these islands. An attempt has also been made to have a rough estimate of the divers' participation and average number of dives performed per year on the islands.

2. Materials and Methods

2.1. Study Design

Present study is a retrospective analysis of routine data from a decompression chamber.

2.2. Data Collection

Data on Decompression Sickness case reports were retrieved from the Clearance Diving Unit (CDU) of Naval Diving Unit, Port Blair and G.B. Pant Hospital, Port Blair.

Since no written records of total number of participation or number of dives performed per year are available with any of the dive centres, an approximate estimation was reached by enquiring various dive centre owners and managers.

2.3. Data Analysis

Individual reports were studied and classified on the bases of incident date, age, nationality, gender of the patient, type of DCS, treatment table used, and outcome of the treatment.

2.4. Ethical Considerations

Present study was reviewed and approved by DS College Ethics Committee in accordance with the Code of Ethics of the World Medical Association (Declaration of Helsinki) for humans and animals.

3. Results

There were more than 16 dive centres in Andaman and Nicobar Islands and the list was growing every year. On an average one lakh divers participated in the sport per year, majority of them were not certified divers but Discover SCUBA Divers (DSDs). About 125000 dives were performed per year on these islands.

Nine patients were given Hyperbaric Oxygen Therapy (HBOT) for DCS in the islands, from 1st January 2011 to 31st June 2015. The frequency of DCS incidents on these islands was about 0.2/10000 dive persons. Majority

of the cases were type II DCS, most common symptoms were tingling in left hand and numbness in left leg. All the patients were presented to the hospital at least six hours after the onset of the symptoms. Royal Navy table 61 or 66 was used to treat the patients [**Figure 1** & **Figure 2**].

All the nine patients recovered completely without any residual symptoms, after receiving HBOT [**Table 1**].

4. Discussion

Frequency of DCS per thousand dives/divers varies all over the world due to myriad reasons. Major problem in calculating DCS incident rate per dive is incomplete records on total number of divers, and dives throughout the world.

Most organized source of data information on divers and diving incidents is from a few organizations, such as Divers Alert Network (DAN) America, Divers Emergency Service (DES) Australia, and American Academy of Underwater Science (AAUS) North America [12] [13]. DAN launched Project Dive Exploration (PDE) in 1995 to collect and interpret data on incidents in recreational diving [8] [14].

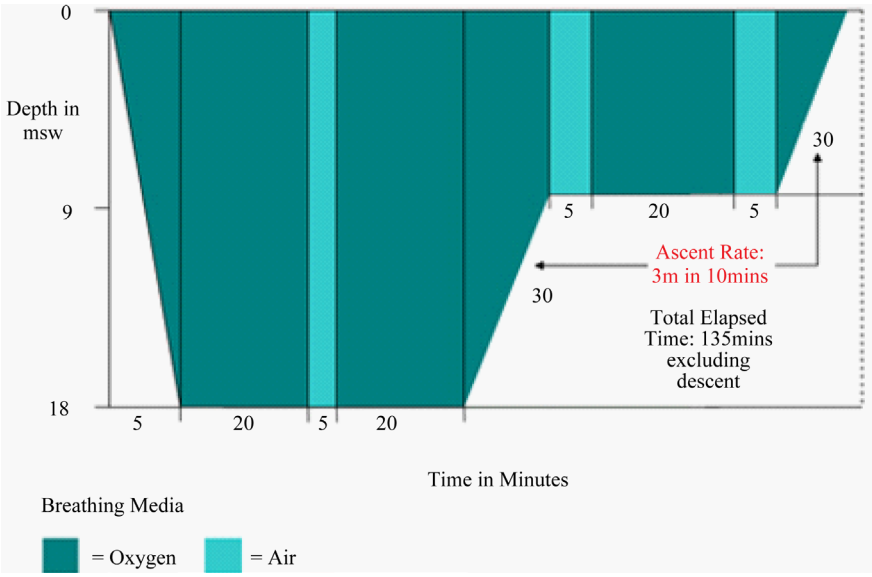

Figure 1. Royal navy treatment table 61 (source: londondivingchamber.co.uk).

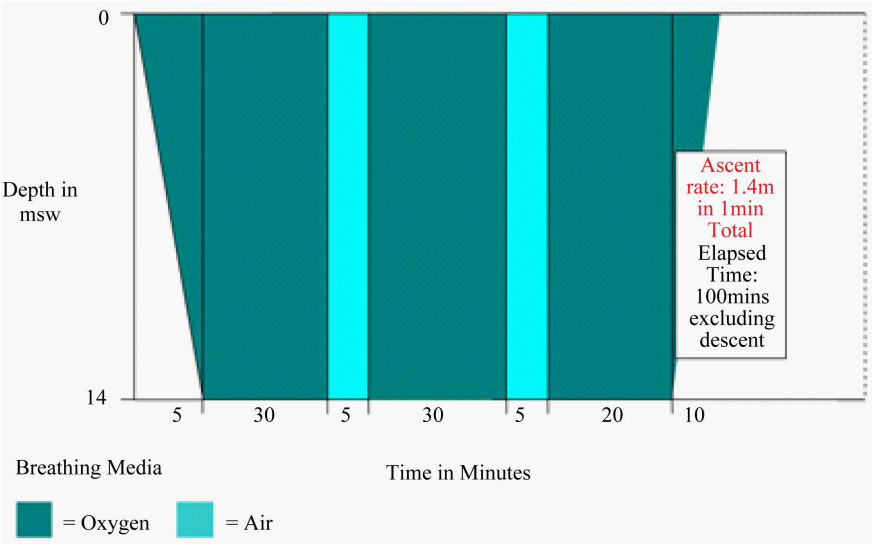

Figure 2. Royal navy treatment table 66 (source: londondivingchamber.co.uk).

Table 1. Incidents of DCS in Andaman and Nicobar Islands during Jan 2011 to June 2015.

Ser	Date	Gender	Age	Nationality	DCS treatment	DCS table used	Post treatment remarks
1	18th Sep 2012	Male	19 years	Indian	Type I DCS		Fully recovered
2	06th Mar 2014	Male	62 years	British	Type II DCS	Table 61	Fully recovered
3	14th Mar 2014	Female	24 years	Indian	Type II DCS		Fully recovered
4	14th Nov 2014	Female	26 years	Holland	Type II DCS	Table 61	Fully recovered
5	19th Nov 2014	Female	32 years	Indian	Type II DCS	Table 61	Fully recovered
6	19th Feb 2015	Male	27 years	Indian	Type II DCS	Table 61	Fully recovered
7	08th Mar 2015	Female	27 years	Indian	Type II DCS	Table 66	Fully recovered
8	12th Apr 2015	Male	40 years	USA	Type I DCS	Table 61	Fully recovered
9	01st May 2015	Female	30 years	Indian	Type I DCS	Table 61	Fully recovered

According to DAN report 2009, frequency of DCS in dive volunteers, with 150739 captured dives in the year 2007, was 2.3 DCS incidents per 10,000 dives and out of all incidents of DCS, fifty percent were type I DCS [9].

Incidents of DCS reported in Andaman and Nicobar Islands were fewer than reported elsewhere in the world, except in South Africa [**Table 2**]. This could be due to the lack of reporting to the hospital by the patients in these areas. In South Africa and India, majority of the data on DCS were extracted from hyperbaric centres, where people are usually referred only in case of severe incidents, while in case of minor incidents people might administer self treatment and do not go to hospital. Our study also indicates higher reporting of type II DCS incidents (66.67% of the total DCS cases) than comparatively milder type I DCS incidents.

It is indicated that some patients of apparently less serious type I DCS are going back home without HBOT. This could lead to undesired manifestations of the illness, later in their lives, since long term studies have not been performed on injured sport divers. Symptoms sometimes disappear even without treatment and sometimes they improve before markedly worsening [9]. Thus, definitive treatment is still strongly recommended.

DCS patients respond well to HBOT with complete or substantial relief in majority of cases, even in case of late presentations [15] [16]. Present study also reinforces the success of Hyperbaric Oxygen Therapy with full recovery of all the patients.

5. Conclusion

Andaman and Nicobar Islands have lower incident rate of Decompression Sickness as compared to many other areas of the world. One of the possible reasons could be underreporting of apparently less severe DCS I incidents by the patients. Since long term effects of untreated DCS have not been studied, and patients respond well to Hyperbaric Oxygen Therapy, awareness among divers is required to encourage them to undergo treatment, even in case of apparently less severe DCS.

Practical Implications

- Since studies on long term effects of DCS on recreational divers have not been performed, divers should be made aware of the possible effects of untreated DCS later in life.
- In present study, HBOT proved a complete success in treating DCS patients, thus divers should be encouraged to undergo therapy, irrespective of the severity of symptoms.

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Table 2. Frequency of decompression sickness around the world.

Paper	Country of origin	Type of diving	Data source	DCS incidents
DAN report 2009 [9]	USA	Recreational	Dive logs of 1069 divers volunteering for PDE & 150739 dives captured in year 2007	4 cases of DCS reported or 2.3 DCI incidents per 10,000 dives
Omhagen H *et al*. [17]	Sweden	Recreational	Review of literature	40 cases treated for recompression per year
Landesberg PG [18]	South Africa	Recreational	Diving accident reports from 1st Jan 1969-31st Dec 1977 in SA	4 diagnosed for DCS
Bessereau J *et al*. [19]	France	All	10 years records of diver patients admitted to Hyperbaric Medicine Department in France	69 cases
Marroni A *et al*. [20]	Italy	All	DCI records of 11 hyperbaric facilities in Italy in 10 years	209 cases
Bierner RJ [21]	USA	Navy	Routine US Navy dive logs	5 DCS incidents per 10,000 dives
Rice GM *et al*. [15]	USA	Navy	Hypobaric exposures and cases from training reports, Naval Operational Medicine Institute	97 cases of altitude DCI per 50,355 hypobaric exposures
Dardeau MR *et al*. [13]	USA	Scientific	10 years diving records of AAUS	33 incidents or .32 per 10,000 person dives

Competing Interests

The authors declare that they have no competing interests.

References

[1] Degorodo, A., Vallejo-Manzur, F., Chanin, K. and Varon, J. (2003) Diving Emergencies. *Resuscitation*, **59**, 171-180. http://dx.doi.org/10.1016/S0300-9572(03)00236-3

[2] Ahmed, S. (2015) Prevalence of Various Diving Related Health Problems in SCUBA Divers. *International Journal of Sports Science*, **5**, 108-112.

[3] Melamed, Y., Shupak, A. and Bitterman, H. (1992) Medical Problems Associated with Underwater Diving. *New England Journal of Medicine*, **326**, 30-35. http://dx.doi.org/10.1056/NEJM199201023260105

[4] Moon, R.E. (1999) Treatment of Diving Emergencies. *Critical Care Clinics*, **15**, 429-456. http://dx.doi.org/10.1016/S0749-0704(05)70062-2

[5] Dick, A.P. and Massey, E.W. (1985) Neurological Presentation of Decompression Sickness and Air Embolism in Sport Divers. *Neurology*, **35**, 667-671. http://dx.doi.org/10.1212/WNL.35.5.667

[6] Greer, H.D. and Massey, E.W. (1992) Neurological Injury from Undersea Diving. *Neurologic Clinics*, **10**, 1031-1045.

[7] Vann, R.D., Denoble, P.J., Howle, L.E., *et al*. (2009) Resolution and Severity in Decompression Illness. *Aviation Space & Environmental Medicine*, **80**, 466-471. http://dx.doi.org/10.3357/ASEM.2471.2009

[8] (1988) Divers Alert Network Report.

[9] (2009) Divers Alert Network Report.

[10] Vann, R.D., Butler, F.K., Mitchell, S.J. and Moon, R.E. (2011) Decompression Illness. *Lancet*, **377**, 153-164. http://dx.doi.org/10.1016/S0140-6736(10)61085-9

[11] www.padi.com

[12] Wilkinson, D. and Goble, S. (2012) A Review 17 Years of Telephone Calls to Australian Diver Emergency Service (DES). *Diving and Hyperbaric Medicine Journal*, **42**, 137-145.

[13] Dardeau, M.R., Pollock, N.W., McDonald, C.M., *et al*. (2012) The Incidence of Decompression Illness in 10 Years of Scientific Diving. *Diving and Hyperbaric Medicine Journal*, **42**, 195-200.

[14] Dovenbarger, J. (1992) Recreational SCUBA Injuries. *Journal of the Florida Medical Association*, **79**, 616-619.

[15] Rice, G.M. and Moore, J.L. (2005) Type II Decompression Sickness in Naval Hypobaric Chambers: A Case of Mistaken Identity? *Aviation Space & Environmental Medicine*, **76**, 841-846.

[16] Blood, C. and Hoiberg, A. (1985) Analysis of Variables Underlying US Navy Diving Accidents. *Undersea Biomedical Research*, **12**, 351-360.

[17] Omhagen, H. and Hagberg, M. (2004) Recreational Diving Accidents in Sweden. *Lakartidningen*, **101**, 774-779.

[18] Landsberg, P.G. (1979) Decompression Sickness in South African Sport Divers. *South African Medical Journal*, **55**, 213-217.

[19] Bessereau, J., Genotelle, N., Brun, P.M., *et al*. (2012) Decompression Sickness in Urban Divers in France. *International Maritime Health*, **26**, 170-173.

[20] Marroni, A. and Catalucci, G. (1981) Considerations on 209 Cases of Decompression Sickness Treated in Hyperbaric Centres in 1978 and 1979. *Minerva Medica*, **72**, 3595-3599.

[21] Biersner, R.J. (1975) Factors in 171 Navy Diving Decompression Accidents Occurring between 1960-1969. *Aviation Space and Environmental Medicine*, **46**, 1069-1073.