135 - DIVE AND DECOMPRESSION SICKNESS - A REVIEW.

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INTRODUCTION

Decompression sickness (DCS) or baropatias are occasioned in a lethal form and is caused by the formation of bubbles of nitrogen (N2) that are formed in the blood and other body tissues when the diver emerges quickly from the dive. So to the N2 have been dissolved this rise should not be done abruptly, which prevents the formation of bubbles of N2, which are dangerous and lethal. Leading to the damage of tissues an of the nervous system, blocking of the arteries, veins, lymph vessels, triggering harmful chemical reactions in the blood. According to the Divers Alert Network (DAN), a global organization that researches and promotes the diving that run safely, less than 1% of divers are attacked by DCS (OLIVEIRA, VASCONCELOS et al., 1993.)

However in the Brazilian coast, as well as in other countries that has subsistence fishing as an economic activity the number of cases surpasses the described by DAN. In Brazil, for example, the scarcity of lobsters on the coast, generated the need of deepwater diving. Resulting the practice of activities with inadequate equipment, but, aiming to emulate the professional divers, who dive with air equipments. In addition these equipment are so sophisticated as expensive, hence the invention of the diving air compressor, easy, cheap and deadly. Since its invention, many fishermen have died or were wounded. (OLIVEIRA, VASCONCELOS et al., 1993) With this exposed the present study aims to conduct a review on the databases, books and websites that allow to understand the extent of the problem of decompression sickness in Brazil.

MATERIALS AND METHODS

The methodological approach applied is the analytical one, characterized by literature review available in articles, journals, books and specialized sites. Enabling the understanding of the phenomenon of the order of public health (THOMAS J, 2007).

LITERATURE REVIEW

We live under certain atmospheric conditions, the atmospheric pressure on the Earth's environment exerts compression on the body, which are already adapted. In an adventure at sea the body is subjected to a number of adverse environmental factors of the ones that the body is used to, but it is possible to overcome or generate physiological rehabilitation with the use of suitable equipment (CAIXETA, 2003; PEREGRINO, 2012).

Some of these equipment allow you to maintain atmospheric pressure at different depths of the sea, even though the conditions are adverse to the man. The equipment called compressible, adapted and able to react favorably to hyperbaric variations. With the advent of the compressives of compressed air, came the first experiences with the ones named dependent devices, supplied by surface, which compresses the air and sends it by hoses to the diver. Arose after the stand-alone equipment, where the air is stored in high-pressure cylinders, conducted by the diver, with freedom of movement. With the advancement of technology, the saturation diving and deep diving is performed, allowing long permanence in considerable depths (CAIXETA, 2003; JORGE, 2012).

Diving cylinders has a gas composition similar to atmospheric air, specifically the mixture contains oxygen (O2) and nitrogen balance (N2) . Unlike the O2, N2 is a gas that is not metabolized by the body. Thus, most of the N2 inspired is expelled at expiration, but a small part of this gas dissolves in the blood and penetrates the tissues. During the dive, cause of the pressure increase occurs changes in the density of this gas, and in the lungs the N2 is captured in proportions exceeding the conditions of an atmosphere (1 atm). It turns out that instead of being vented, shall be dissolved in the tissues of the body at the same time the increase or maintenance of diving depth. Upon returning to the surface, during the decompression or reduction of pressure on this gas becomes dissolved in the body tissues and transported to the lungs to be expelled. If this rise is abruptly this dissolution of N2 may not occur, generating potentially hazardous bubbles of N2 in the tissues, which will compress nerves, clog arteries, veins, lymph vessels and unleash lethal biochemical reactions (ARTIGOS CILINDROS DE MERGULHO, 2012).

The amount of N2 dissolved in the tissues is proportional to the depth and the dive time, these parameters are stipulated by tables, which determine how much time a diver must stay safely at a certain depth. Exceeded that determined time should be made stops during the ascent to the N2 is eliminated without risk of bubble formation stops that are called decompressive stops .

Even by following all safety procedures, some factors should be considered: the physiological predisposition as obesity, fatigue, age, sedentary, lung diseases and circulatory, musculoskeletal injury and or recent use of alcohol. Environmental predisposition factors like cold water, exhausting work underwater, dangerous sea conditions and hot dips should also be considered (CAIXETA, 2003; VAISSMAN, 2004; SILVA, 2010).

After diving, is always observed a significant amount of N2 in the diver's body, the single remained for some time in the same depth will cause it to be deleted. Risks as back right after this dive or travel to places with higher altitudes may also cause decompression sickness (DCS) (LAZZETTI, 2003; SILVA, 2010).

The DCS is the consequence of the presence of N2 bubbles in the tissues and bloodstream, clinical syndrome with specific signs and symptoms, disbaric disease caused by the release of dissolved gas bubbles in the blood or tissues are caused by improper venting about the duration and depth of the dive.

Have as fundamental elements in its genesis three basic fundamental elements with interdependent variations that are depth, dive duration and decompression time, stressing that the duration of the dive is inversely proportional to depth, the greater the depth less than the time that the body can withstand without major consequences. Also, the higher the depth more

slowly should be the return to the surface. Added to this factor is important to emphasize other complexities that can predispose as: Obesity, carbonic gas level, exercise, temperature, water balance, local factors and adaptation (SILVEIRA, 1994; CAIXETA, 2003).

They can cause either permanent neurological damage or death. The different manifestations are the result of the presence of bubbles formed in tissues and circulatory system or as a result of these variations in environmental pressure. The damage may have direct features that manifest themselves in symptoms of lesions in organs affected, mechanically produced on the tissues. Indirect damage resulting from the blockage of the circulation of the blood vessels leading to hypoxia (SILVEIRA, 1994).

DCS is divided in types 1 and 2. Type 1 is characterized by the presence of soft pains that start in about 10 minutes after diving, having features like a rash or burning sensation on the skin and rashes. Already the DCS of type 2 is characterized by pulmonary symptoms, hypovolaemic shock or nervous system involvement (SILVEIRA, 1994).

The occurrence of lung DCS represents about 2 of the cases, is characterized by a burning below the sternum during inspiration, coughing and respiratory severe agony, usually have their symptoms started 12 hours after diving and can persist from 12 to 24 hours even leading to death. The hypovolaemic shock includes the transfer of fluid from the space within for the extra vascular, causing thrombus by activation of blood coagulation and endothelial vasoactive substances. The Patent foramen ovale also influences the DCS since they can allow the passage of bubbles of N2 of the pulmonary circulation to the systemic, bypassing the pulmonary filter and effects mainly affecting the brain.

A question still discussed in the literature is whether Arterial Gas embolism (AGE), is a third type of DCS, as some authors consider it, while others consider like a problem apart and rare, but also from the blistering of N2. Regardless, the AGE is caused by the rupture of veins inside of the lungs due to a lung super pressurization during the dive, allowing the alveolar gas enters on the systemic circulation causing Pistons, which are still expanding at the same time the depressurization due to the rise of the dive, depending on where it been installed causes different problems, such as coronary artery embolism, leading to a myocardial infarction (MI) in brain arteries a cerebral vascular accident (CVA) and etc.

The difference between the DCS and AGE is that while any type of diving can cause AGE which starts immediately and is manifested in the brain, in DCS the plunge must have deep and long enough to saturate the tissues with N2, it start up to 36 hours of diving and the neurological deficit manifests itself in the spinal cord and brain.

However, both the DCS type 1, 2 How to AGE should have their treatment started immediately. For the DCS type 1, administration of O2 to 100% at the same level, reduces the frame to safe levels. For the DCS type 2 must make a hyperbaric oxygen therapy as fast as possible with gradual decompression which allows the slow elimination of N2(SILVEIRA, 1994).

In Brazil the War Navy is the pioneer of underwater activities (since 1930), meets in his hyperbaric chambers their divers and civil elements victimized by hiperbaric accidents, but there are already private services that offer this service.

Currently, in the civil environment, every day, workers who have undergone several capacity-building trainings come into coffins tyres to work, a fact that occurs with numerous teams of divers who operate along the Brazilian coast, is in modern underwater oil exploration platforms, installing and repairing oil pipelines; Oceanic interceptors; works of construction and maintenance of piers and foundations of bridges, exposing themselves to hiperbaric accidents (KIEFER, FAGÁ et al., 2001;CAIXETA, 2003).

However, along the same coast is another phenomenon, where the inhabitants of the communities and the fishing colonies, seeking in lobster fishing livelihoods, however the practices they learned were results of a continuing process, with no technical training, only passed from father to son, all the days go to sea to hunt for lobsters, undergoing the unsanitary conditions varied during the dive, with exposure and risks to health and life. This practice develops for many years with the named “artisanal fishers" in two ways that are snorkeling, fitted with a mask, flippers and have depth limit approximately 18 meters and only use their own breath and the one with compressor, ranging the larger depths, boats also increased as more reach to the sea, uses coupled to the boat engine an air compressor, which has an outlet hose to carry the air to a balloon (cooking gas cylinder), which takes the air for almost 300 m of hose with a nozzle for each diver that dive up to 40 m deep .

It is shown how precarious and dangerous are the ways that are exposed these workers of the sea, is understood the cause of many accidents and deaths are decompression sickness, illnesses of the dive or accidents such as drowning diving and shipwrecks .

Some of these divers ignore the discomforts of sorrows, only complain of symptoms of decompression sickness evil when her condition becomes so advanced that it can barely remain standing, walking or urinate on their own. There are no laws that protect sufficiently or to families giving much needed support and security in tough times (KIEFER, FAGÁ et al., 2001).

CONSIDERATIONS

The objectives and methodological strategies of this work were identified in specialized literature, where opinions of authors on decompression sickness or Baropatias show that this topic has been, over the years, little discussed, referenced and debated by the conflict between the ways in which it has been conducted the problem(KIEFER, FAGÁ et al., 2001).

There is the conception that the systematized diving, with scientific technical guidance is dependent on the effectiveness of their implementation and their suitability to the level of development of individual prerequisites, and are in a complex arising from the pedagogical processes(PADIBR, 2012).

It is observed that the diving practiced in isolation, by fishermen of lobsters, with guidance given by their ancestors, have differences in this regard, and that according to most authors studied, these "divers" submitted are not in the phase of development most appropriate for the acquisition of these basic skills necessary to minimize the risk of these diseases (KIEFER, FAGÁ et al., 2001).

It is evidenced that the risks of contracting the disease stops by trained divers are minimal (<1%) as their training sessions are conducted in a proper manner. There is treatment that involves recompression in hyperbaric chamber to reduce the diameter of bubbles responsible for the clinical picture and cause the absorption of its gaseous content by surrounding tissues. The more early is performed the recompression, faster is the regression of the picture, more complete will be the recovery and lower the likelihood of complications. The deep and long-lasting dives are more dangerous and should be planned in its smallest details. The divers must go through rigorous medical inspection laboratory and radiological special examinations, being tested in hyperbaric chamber deep. We suggest that this treatment is dispensed to our Riverside, scientific technical training so as to minimise the risks on them as well.

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DIVE AND DECOMPRESSION SICKNESS - A REVIEW.

ABSTRACT

Introduction: the objective of this study was to investigate the decompression sickness or Baropatias in various modalities of diving at the Brazilian coast, giving attention to the public health problem that affects fishermen, specifically those of lobsters, which utilize empirical ancestors teachings. Materials and methods: the method applied was an analytical type, having with database specific sites, articles, journals and books in an attempt to explain the phenomenon. Results: it was evidenced that the theme over the years haven't been getting the attention and much less debated the way it's been conducted. Conceives that the practice of diving, free from accidents, depends on the effectiveness, compliance with the technical requirements and their adaptation to the levels of development of individual prerequisites. Another highlight was that the dive modes are not analyzed in isolation, with no differences in this respect, and that in most studies, are only considered cases where the diver is empowered. Conclusion: The notes indicate that the incidence of decompression sickness is insignificant, about 1% of the divers enabled in the world are affected, however, there is a gap, which don't describes the number of cases concerning subsistence fishing.

KEY WORDS: Decompression sickness, Baropatias, diving, lobster fishermen.

PLONGEE ET ACCIDENT DE DECOMPRESSION – EXAMEN.

RÉSUMÉ

Introduction: Le but de cette étude était d'étudier la maladie de décompression ou Baropatias dans diverses formes de plongée au large de la côte du Brésil, attirant l'attention sur le problème de santé publique qui touche les pêcheurs, en particulier les homards, qui utilisent empiriques enseignements ancestraux. Méthodes: La méthode a été appliquée à la fois le type d'analyse, en tenant compte avec les sites de bases de données spécifiques, des articles, des magazines et des livres pour tenter d'expliquer le phénomène. Résultats: Il a été montré que la question au cours des années pas reçu beaucoup moins d'attention polemizado la façon dont le problème a été menée. On conçoit que la pratique de la plongée, sans accident dépend de l'efficacité de la conformité avec les exigences techniques scientifiques et de leur pertinence pour les niveaux de développement des conditions individuelles. Il est à noter également que les modalités de plongée ne sont pas considérés de manière isolée, sans différence à cet égard, et que, dans la plupart des études, ne sont considérés comme des cas où le plongeur a dédouanement. Conclusion: Les notes indiquent que l'incidence de la maladie de décompression est négligeable, environ <1% des plongeurs qualifiés dans le monde sont touchées, cependant, il ya un écart, qui ne révèle pas le nombre de cas liés à la pêche de subsistance.

MOTS-CLÉS: accident de décompression, Baropatias, la plongée, les pêcheurs de homard.

BUCEO Y LA ENFERMEDAD POR DESCOMPRESIÓN - UNA REVISIÓN.

RESUMEN

Introducción: El objetivo de este estudio fue investigar la enfermedad de descompresión o Baropatias en varias formas de buceo en la costa de Brasil, llamando la atención sobre el problema de salud pública que afecta a los pescadores de langostas, en concreto, que utilizan enseñanzas empíricos del ancestrales. Métodos: El método fue aplicado tanto al tipo de análisis, tomando con los sitios web de bases de datos específicas, artículos, revistas y libros en un intento de explicar el fenómeno. Resultados: Se ha demostrado que no es el problema en los últimos años ha recibido mucha menos atención polemizado la forma se ha llevado a cabo el problema. Se concibe que la práctica del buceo, libre de accidentes dependa de la

efectividad del cumplimiento de los requisitos de las técnicas científicas y su adecuación a los niveles de desarrollo de los requisitos previos individuales. Cabe señalar también que los arreglos para el buceo no son vistos de manera aislada, sin diferencias en este sentido, y que en la mayoría de los estudios, sólo se consideran los casos en que el buzo tiene holgura. Conclusión: Las notas indican que la incidencia de la enfermedad por descompresión es insignificante, sobre <1% de los buceadores cualificados en el mundo se ven afectados, sin embargo, existe una brecha, que no revela el número de casos relacionados con la pesca de subsistencia.

PALABRAS CLAVE: Enfermedad de Descompresión, Baropatias, buceo, pescadores de langosta.

MERGULHO E DOENÇAS DESCOMPRESSIVAS – UMA REVISÃO.

RESUMO

Introdução: O objetivo deste estudo foi investigar as doenças descompressivas ou Baropatias nas diversas modalidades de mergulho no litoral Brasileiro, invocando atenção ao problema de saúde publica que acomete os pescadores, especificamente os de lagostas, que se utilizam dos ensinamentos ancestrais empíricos. Materiais e métodos: O método aplicado para tanto foi do tipo analítico, tendo com base de dados sites específicos, artigos, periódicos e livros, na tentativa de explicar o fenômeno. Resultados: Ficou evidenciado que o tema ao longo dos anos não vêm recebendo a atenção e muito menos polemizado da maneira como tem sido conduzido o problema. Concebe-se que a prática de mergulho, livre de acidentes depende da eficácia, do cumprimento das exigências técnicas científicas e sua adequação aos níveis de desenvolvimento dos pré-requisitos individuais. Destaca-se, ainda, que as modalidades de mergulho não são analisadas isoladamente, não havendo divergências neste sentido, e que na maioria dos estudos, só são considerados os casos onde o mergulhador tem habilitação. Conclusão: Os apontamentos indicam que a incidência de doenças descompressivas é insignificante, cerca de <1% dos mergulhadores habilitados no mundo são acometidos, no entanto, observa-se uma lacuna, que não descreve o número de casos relacionados com a pescar de subsistência.

PALAVRAS CHAVES: Doenças descompressivas, Baropatias, mergulho, pescadores de lagosta.