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The Aquaphobia: Prospects of the Virtual Reality Exposure

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Abstract

Aquaphobia is a persistent and abnormal fear of water. Aquaphobia is a specific phobia that involves a level of fear that is beyond the patient's control or that may interfere with daily life. People suffer aquaphobia in many ways and may experience it even though they realize the water in an ocean, a river, or even a bathtub poses no imminent threat. With the intent of establishing a brief picture of the Clinical of phobias around the Virtual Reality Therapy, this article highlights the lack of researches about the aquaphobia. After presenting the definition of this psychopathology and the Virtual Reality Therapy, the authors put the emphasis on the efficacy of this treatment for phobias thanks to the wide scientific literature available on this matter. Considering these results, the authors present their reflexion about the pertinence of Virtual Reality Therapy for the treatment of aquaphobia.

1. Introduction

Phobias can be considered as a specific anxiety disorder [28] or as a symptom of a pathology more important that could explain why the phobia appeared in the first place (ESPT). They are widely described as irrational, inadequate or excessive fears of an internal or external stimulus (DSM-V). Several theoretical currents such as psychoanalysis, cognitive sciences and neurobiology are interested in studying how phobias appear and their underlying mechanisms as well as their treatments [14]. Nowadays, they are frequently associated with pavlovian and skinnerian conditioning processes and are integrated in Cognitive and Behavioral Therapies's explanatory models [25]. As a matter of fact, according to the French National Authority for Health [10], exposure therapies aiming to desensitize to excessive emotion of fear and anxiety of an individual facing a stimulus interpreted as a danger, have already proven their effectiveness. Some explanations add to this scientifically approved clinical effectiveness, a neurobiological dimension. They link together the effects of conditioning and deconditioning to the desensitization of the Amygdala, cerebral structure which function is to decode, to feel and to manage fear and anxiety [1].

The purpose of this highly schematic introduction is to put phobias and their conceptions back in the context of scientific breakthrough upon which psychotherapeutic treatments being developed nowadays, can rely on. Since a comprehensive approach of phobias' underlying theorisations is not the main point of this article, we will now focus on aquaphobia.

2. Aquaphobia

Nowadays, the aquaphobia represents a field of research of this psychopathology which is still not much in-depth. This specific phobia can be associated to the previous definition but, it is relevant to present it, with its particular characteristics.

The aquaphobia is a term derived from latin (aqua means water) and from Greek (phobos means fear). According to the author and psychiatrist J. Palazzolo, it refers to an abnormal and out of control fear of the water [17]. Any confrontation or anticipation of the touch with water, can lead to an immoderate and unsuitable fear which can provoke panic attack. This irrational reaction can be known by the subjects, nonetheless, they still have got no control on it and this situation can lead to avoidance behaviours as it is mentioned in the DSM-V.

3. The Use of the Cognitive and Behavioural Therapies

The aquaphobia, as every phobia which is a nuisance for daily life, needs a treatment [17]. For this, the French National Authority for Health [10] advises to use the Cognitive and Behavioural Therapies (CBT). This kind of psychotherapies is based on the principles of the classical conditioning and operant conditioning for the behaviors while considering cognitions and emotions [6]. Nowadays, the use of CBT for phobias is widespread. For all that, CBT are still an object of researches especially within the framework of new technologies [2]. That is how the use of virtual reality has emerged with the same based principles as the CBT: the exposition to the problematic stimulus to result in a deconditioning of the anxious response [21].

4. The Evolution of the Virtual Reality

The virtual reality is not a recent innovation. Actually, Sutherland et Evans developed a helmet, the "Head-Mounted-Display" in 1968 [24]. They wanted to propose a device in three dimensions to put the image in perspective which could be modified when the user moves as a real object. Among others important progresses in the field, some scientific conceptualisations emerged. For instance, Witmer et Singer [27] believe that the virtual environments function thanks to the sense of presence. They define it as « the subjective experience of being in one place or environment, even when one is physically situated in another ». This immersion is the result of the environment created by the virtual reality, which can bury the user in a realistic fiction where he can "really" move and progress.

Gradually, technologic developments and enhancements have improved this device. Bit by bit, a lot of fields explored and appropriated the virtual reality as video games, military training or psychotherapies. Since this extension, researchers take an interest in anxiety disorders especially phobias [18].

Technological and psychological progresses have lead to the integration of the virtual reality in the clinical practice. Nowadays, we know the Virtual Reality Therapy mostly for its use in the phobias thanks to its principles of exposition as CBT [21].

5. Efficacy of Virtual Reality Exposure

Numerous virtual reality exposure protocols have been tested. Their effectiveness has been proven, and it has even been estimated that such effectiveness was equal or superior to those of the in vivo exposure. We will note that most of those studies were about treating phobias through virtual reality without expend their research to aquaphobia.

Regarding the specific phobias, Garcia- Palacios et al. [8] expressed their interest for the efficacy of the in virtuo exposure in the case of arachnophobia (the fear of spiders). Thanks to the use of a protocol comparing an experimental group (exposed to the virtual reality) to a control group, the authors succeeded to show that the clinical improvements (regarding the subjectives measurements of the fear) were higher in the experimental group (83% of the patients show a significant improvement) than in the control group (0%).

The effects of the exposure therapies are already well demonstrated, however, these results allowed to start an extension of this knowledge to the in virtuo exposure.

Regarding some more objective measurements, Cote and Bouchard [5] conducted a study by a pre-post intervention with a virtual reality therapy.

The measurements concerned the heart rate and the response time during a computer-based test carried out in attendance of a phobic object. After the virtual reality intervention, the authors observed a decrease of the heart rate during the presence of the phobic object. A reduction of response time to the computer-based test was also triggered.

Several others studies conducted this kind of researches concerning the specific phobias as Botella et al. [3].

About the environmental context of the specific phobias, several researchers worked on it since 1995 as Rothbaum et al. [23]. For this study, they assessed the anxiety of their subjects presenting acrophobia in attendance to their phobic object: the height. After this baseline, the authors formed two groups: a control group and the experimental one. This last one was exposed to the virtual reality therapy. Eight weeks later, the assessments of the anxiety were repeated. The comparison of the results showed a significant decrease of the anxiety for the experimental group. The control group did not show any modification.

In 2002, Emmelkamp et al. [7] worked on the efficacy of the in virtuo exposure at low cost in comparison to the classical in vivo exposure. Their results allowed them to conclude that the virtual reality exposure, even at low cost, is as efficient as the real exposure.

In 2006, Coelho et al. [4] conducted a longitudinal study on a

little sample of subjects with acrophobia. The short term aim was to measure their anxiety just after three sessions of virtual reality exposure. After these, the authors measured the continuity of the positive effects for one year after the exposure. The results revealed that the effects on the behaviours and on the anxiety were maintained even one year after the therapy.

About the situational phobias, the phobic objects are a little more complicated to recreate for the researchers.

Rothbaum *et al.* [22] conducted a wide extent study in 2006. It was about the virtual reality exposure for the phobia of the plane. The aim was to compare the efficacy of the in virtuo exposure and the classical in vivo exposure et then, to observe the long term effects for six months to one year. The results showed that long term satisfaction and the reduction of the anxiety was similar for the two types of exposure. Their efficacy was sustainable even one year after the treatments.

In 2008, Malbos and *al.* [16] kept going, demonstrating that not only was VR effective, but its results were long lasting in the case of claustrophobia. Those studies continued and even spread to several other situational phobias such as the fear of driving [26], fear of elevators, social phobias [13], agoraphobia [19].

6. Conclusion and Prospects

The whole of literature presented in this article enables to give a wide view on the clinical of phobias associated with the use of the Virtual Reality Therapy across the prism of the Cognitive and Behavioural Therapies.

This work underlines the efficacy of this treatment but it also puts forward a field of research still not much explored: the aquaphobia. For all that, the Virtual Reality Therapy seems to be really relevant. Indeed, this psychotherapeutic approach enables to create an exposition to some situations hard to access with the in vivo exposition: for instance the immersion into the water.

Besides, some studies show a preference from patients for the in virtuo exposition [9]. It can even circumvents the refusal of the patients to start an in vivo exposition [15].

To conclude, these observations and reflexions could lead to open the way towards new experimental studies on this matter. The results could help to generalize the use of the Virtual Reality Therapy for the treatment of the aquaphobia.

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