

Psychiatric and Psychometric Study Among Divers

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The aim of this work was to study psychiatric manifestations among divers in the naval forces in Alexandria, Egypt. One hundred divers were chosen according to multistage stratified random sampling technique. Twenty non-divers from the same naval unit were taken as a control group. Complete psychiatric examination and follow-up were done together with psychometric study.

The results seemed to provide evidence for a possible impact of emotional measurement, social adjustment and diving experience in relation to stressful diving conditions in Navy divers.

(Egypt. J. Psychiat., 1994, 17: 87-93).

Introduction

The Navy conducts several specialized training programs designed to meet the various needs of a diversified naval capacity.

Various psychological measures have been used in prediction studies of subjects under water training success (Biersner et al, 1977). Subjects mood have been a recent focus for study in stressful underwater tasks (Ryman and Biersner, 1975). Certain mood scales and mental attitude were found to be of value in predicting performance of under water divers (Armbruster et al., 1973). These mood scales have been modified for use in underwater studies (Armbruster et al., 1973). Moods indicative of pleasantness (happiness, alertness, activity) have correlated with successful under water performance, while unpleasant moods (anger, fear, lethargy) have corre-

lated with failure (Armbruster et al., 1973).

Different studies on divers provided conclusive evidence that chronic exposure to cold stress increases the metabolic rate and with an attendant increase in peripheral temperature (Dembert et al.,

1983). High pressure nervous syndrome is considered to be a function of raised hydrostatic pressure and is exacerbated by the rate at which pressure is applied. This high pressure causes severe disorientation, gross tremors, myoclonic jerking, muscle fasciculations, dizziness, incoordination, nausea and vomiting (Dahlack et al., 1972). It was observed that some symptoms of which, at least can be attributed to the elevated alveolar CO₂ tension. Some other symptoms may have been due either to helium or to the pressure per se, and it is impossible to choose at present between these two possibilities (Fenn, 1967).

The appearance of diving fear is by far the most frequent reason which prevents student divers to continue their training. Indeed, many stresses contribute to the appearance of this cold darkness, self dependence underwater, lack of normal communication, isolation and the realization of the total dependence of

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the proper functioning of the apparatus (Bachrach et al., 1987).

The aim of the present work was to study the psychiatric manifestations among divers in the Naval Forces in relation to their age and periods of diving.

Subjects and Method

100 divers among the Naval Forces were selected by stratified random technique. They were divided according to their age into 3 groups.

Group I: Less than 22 years, they were 20 divers. They were subdivided according to the type of breathing gas into a) oxygen breathing group (n=10), b) air breathing group (n=10).

Group II: Divers' age from 22 - <27 years. They were 40 divers and further subdivided into a) oxygen breathing group (n=20), b) air breathing group (n=20)

Group III: Divers' age 27 years and over, they were 40 divers and further subdivided into a) oxygen breathing group (n=20), b) air breathing group (n=20).

A control group of 20 Naval Forces Personnel (non divers), were selected by a stratified random technique from the according to their age.

Group I: their age less than 22 years (n=4).

Group II: their age from 22 - <27 years (n=8)

Group III: their age 27 years and over (n=8)

All the studied cases were subjected to the following:

- 1- Complete clinical examination to exclude any physical diseases.
- 2- Complete psychiatric clinical examination.
- 3- Psychometric evaluation: the Arabic version of MMPI applied to all divers and controls.

Results

Age: The age for O₂ breathers was 25.9 ± 5.96 year and for air breathers was 27.6 ± 8.29 year and for non divers was 28.65 ± 8.4 year. Statistically, there was no significant difference between the mean age in the three groups.

Education (Table 1): 81% of divers and 71% of non divers had got preparatory school, while 17% of divers and 15% of non divers were university graduates. The difference between O₂ breathing and air breathing divers and non divers as regard their education was statistically significant ($X^2=11.2705$).

Sleep: (Table 1): the percentage of O₂ breathing and air breathing divers and non divers who had full night sleep were 46%, 52% and 85% respectively. ($X^2=9.0909$ significant) The difference between divers and non divers was also significant ($X^2=7.33$)

Cigarette (Table 1) : There was a significant difference between smoking divers (58%) and non divers (30%) ($X^2=4.1852$).

Past mental disease: The difference between divers and non divers as regard past history of mental disease was not statistically significant ($X^2=4.0122$).

Mood changes (Table 2): The percentage of divers and non divers who had stable mood during interview were 46% and 55% respectively, while the percentage of labile mood among them were 24% and 25% respectively. Difference between both groups as regard their mood ($X^2=56.3700$).

Threatening thought (Table 2): 71% of divers and 75% of non divers didn't attribute any symptom due to diving ($X^2=3.019$). The percentage of O₂ breathing, air breathing divers and non divers who did not attribute any life threatening thoughts to diving were

Table 1
Educational Level, Pattern of Sleep and Smoking Among Oxygen Breathing
Divers, Air Breathing Divers and Non Divers.

	Non divers (n=20)				Drivers (n=100)				X ²	N	%	X ²
	N	%	O ₂ breathing (n=50)		Air breathing (n=50)							
			N	%	N	%						
Educational level:												
Preparatory	14	70	38	76	43	86	11.2705*	81		81	7.0547*	
Secondary	3	15	0	0	2	4		2		2		
University	3	15	12	24	5	10		17		17		
Full night sleep:												
Full night sleep	17	85	23	46	26	52	9.0909*		49	49	7.3333*	
No full night sleep	3	15	27	54	24	48		51	51			
Smoking:												
Smokers	6	30	28	56	30	60	5.4107	58		58	4.1852*	
Non smokers	14	70	22	44	20	40		42	42			
Total	20	100	50	100	50	100		100		100		

Table 2
Mood Changes and Threatening Thoughts Attributed to Diving Among Oxygen
Breathing, Air Breathing Divers and Non Divers During Interview.

Breathing, Air Breathing Divers and Non Divers During Interview.											
	Non divers (n=20)				Drivers (n=100)						
			O ₂ breathing (n=50)		Air breathing (n=50)		X ²			X ²	
	N	%	N	%	N	%		N	%		
Mood:											
Stable	11	55	21	42	25	50	6.3700	46	46	3.3726	
Labile	5	25	13	26	11	22		24	24		
Depressed	1	5	13	26	8	16		21	21		
Anxious	1	5	1	2	3	6		4	4		
Fearful	2	10	2	4	3	6		5	5		
Total	20	100	50	100	50	100		100	100		
Threatening Thoughts:											
Death	8	40	6	12	10	20	42.6987	16	16	15.6623	
Accident	2	10	6	12	13	26		19	19		
Poisoning	0	0	1	2	1	2		2	2		
Concentration	0	0	1	2	0	0		1	1		
Rupture lung	5	25	4	8	3	6		7	7		
Rupture drum	0	0	0	0	4	8		4	4		
Osteomyelitis	0	0	1	2	2	4		3	3		
Skin cyanosis	0	0	0	0	1	2		1	1		
Hearing	0	0	1	2	0	0		1	1		
More than one thought	0	0	2	4	4	8		7	7		
No threatening Thoughts	5	25	27	54	12	24		39	39		
Total	20	100	50	100	50	100		100	100		

Table 3
Memory Affection Among Divers and Non Divers.

Total	Non divers (n=20)		Drivers (n=100)		
	N	%	N	%	χ^2
Immediate memory:					
Good memory	17	85	77	77	0.2455
Bad memory	3	15	23	23	
Recent memory:					
Good memory	16	80	52	52	5.3212*
Bad memory	4	20	48	48	
Remote memory:					
Good memory	17	85	77	77	0.2455
Bad memory	3	15	23	23	
Total	20	100	100	100	

Table 4
Neurotic Triad Subscale of MMPI Clarifying the Level of Hysteria, Depression, and Hypochondriasis Among Divers and Non Divers.

Neurotic trait	Non divers (n=20)	Divers (n=100)	
	Mean $\pm$ S.D.	Mean $\pm$ S.D	"t"
Hysteria	43.5 $\pm$ 8.13	47.97 $\pm$ 8.09	2.2539*
Depression	44.3 $\pm$ 6.71	49.32 $\pm$ 9.22	2.2727*
Hypochondriasis	41.5 $\pm$ 5.61	43.41 $\pm$ 5.86	1.3397

54%, 24% and 25% respectively. 12% of O₂ breathing divers and 20% of air breathing divers attributed death from diving in comparison to 40% in non divers. This showed that there was no statistical significant difference ($\chi^2=42.6987$).

Memory (Table 3): The majority of divers (84% O₂ and 70% air breathers) and 85% of non divers had good immediate memory on examination by recalling of digits forward and backward.

There was a statistical significant difference between divers and non divers as regard recent memory ($\chi^2=5.3212$). As

regards remote memory, there was no statistical significant difference between divers and non divers ($\chi^2=0.2455$).

MMPI (Table 4): There was a statistical significant difference ($t=2.25339$) between mean score of hysteria subscale among divers (47.97 $\pm$ 8.09) and non divers (43.5 $\pm$ 8.13). Also, there was a statistical significant difference ($t=2.2727$) between mean score of depression subscale among divers (49.32 $\pm$ 9.22) and non divers (44.3 $\pm$ 6.71). But in relation to hypochondriacal subscale, there was no statistical significant differ-

ence between divers (43.41 ± 5.86) and non divers (41.5 ± 5.61), ($t= 1.3397$).

There was no statistical significant difference ($t=0.825$) between the mean period of diving, the mean frequency of diving ($t=0.857$) and mean depth of diving ($t=1.001$), in relation to hysterical subscales among divers and non divers.

There was no statistical significant difference ($t=1.281$), between the mean period of diving (8.34 ± 7.36 year), for divers with normal level of depression subscale (below 70) and mean period of diving (8.102 ± 7.107 year) with high score of depression.

Discussion

The results of the present study seemed to provide evidence for a highly possible impact of emotional measurements, social adjustment, and diving experience in relation to stressful diving conditions in Navy divers.

In relation to the educational level of Navy divers, the present study showed a significant statistical difference between divers and non divers ($X^2= 7.0547$). A different score among the physiological and emotional measurement indicating responsiveness to stress correlated significantly with education, diving experience and social adjustment. In agreement with this data, U.S. Navy divers were tested for personality and demographic data, and it was found that there was significant correlation between education and diving experience (Biersner and Larocco, 1987).

In relation to fullnight sleep there was statistical significant difference between divers and non divers ($X^2= 7.333$). This result confirms the work of Bennett and McLeod (1984) who found that at depth greater than 160 m divers had poor sleep with nightmares (Bennett and McLeod, 1984).

48% of divers had past history of mental complaint but with no history of

predive decompression sickness, however, there was no statistical difference between divers and control group as regard past history of mental disease ($X^2= 4.0122$). This result was in contradiction with Tondem et al, study in 1990, who confirmed that 3 symptoms (tremor, mental fatigue and reduced appetite correlated significantly to a history of predive decompression sickness (Tondem et al, 1990).

The present study showed that there was no significant difference between divers and non divers as regard anxious mood, this was in agreement with other studies (Biersner and Larocco, 1987), which may be due to emotional adaptation to nitrogen narcosis, which is associated with breathing hyperbaric air.

In the present study, it was found that 6% of air breathers and 2% only of O₂ breathers, were anxious, where the air breathers dive at more depth than O₂ breathers. This agrees with a study carried by Gilman et al (1989), who found that there was a pressure dependent decrease in absolute amount of transmitter released as well as decrease in GABA.

Again, 21% of divers in the present study had depressed mood while 5% of non divers had depressed mood. But in contrary to this result Adams et al (1987), found a frequent report of feelings of euphoria secondary to increasing Beta endorphin level.

Regarding thought disturbance, the present study showed that the majority of studied cases had no thoughts about symptoms attributed to diving, this was not in agreement with a study done by Tondem in Norway (1990). He reported clinical symptoms observed during diving as nausea, diarrhea, stomach pain, reduced appetite and tremors (Tondem et al, 1984).

Threatening thoughts attributed to diving like death, accidents and poison-

ing in this work in air and O₂ breathers ranged between 2% to 26%. This may be explained by good and continuous training.

The present study showed that there was no significant difference between divers and non divers as regard immediate and remote memory ($X^2=0.2455$), this result was in agreement with Overman's study 1989. Again, in the present study, there was a significant difference between divers and non divers as regard recent memory ($X^2=5.3212$), which was confirmed also by Williamson et al., 1987.

Application of MMPI subscales among the studied cases showed a significant difference as regard hysteria subscale between divers and non divers ($t=2.2727$), while the mean score of hypochondriasis subscale was not statistically significant.

These changes of test scores were shown without evidence of gross changes in C.N.S. Also, the present study showed no significant difference among O₂ and air breathing divers as regards the mean score of three subscales of MMPI tested where $t=0.7526$, $t=0.9347$ and 0.0849 for hysteria, depression and hypochondriasis respectively.

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Étude psychiatrique et psychométrique des plongeurs

Cette étude vise étudier les manifestations psychiatrique parmi les plongeurs des forces navals à Alexandrie. Cent plongeurs ont été choisis selon la technique multi-stade stratifié de prélèvement au hasard. 20 non-plongeurs de la même unité naval ont été pris comme groupe contrôle. Une examination psychiatrique complète et suivi et une étude psychométrique ont été faites. Les résultats paraient confirmant une évidence d'un impact possible de la mesure de l'émotions, l'ajustement sociale et l'expérience de plonger en relation avec les conditions difficile de plonger chez les plongeurs navals.

دراسة طبية نفسية لتقييم الغواصين

يهدف البحث الحالي إلى دراسة الأعراض النفسية بين الغواصين في القوات البحرية بالأسكندرية- جمهورية مصر العربية. وقد تم إجراء هذا البحث على مائة غواص تبعاً لطريقة العينة العشوائية متعددة الخطوات، وتم اختبار عشرين فرداً من غير الغواصين من نفس الوحدة البحرية كعينة ضابطة. وقد تم إجراء الفحص النفسي الشامل ومتابعة الحالات وكذلك القدرات النفسية للمجموعتين. أظهرت نتائج البحث أن هناك علاقة مباشرة بين كلاً من الحالة المزاجية والتوازن الاجتماعي والخبرة السابقة في الغوص على كفاءة الغطاس في ظروف الغوص العصيبة.