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Preferences of Academic Researches and Pattern of Utilization of Behavior Laboratory Science for Preclinical Researches - a Cross Sectional Study

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ABSTRACT

Introduction: Several studies confirmed the relation between mortality, behavioral and social factors and emphasized the importance of behavioral and social science to public health practice. **Aim:** This study aimed to determine the preferences of the researchers who utilize the behavioral sciences laboratory at the Preclinical Research Unit and define the pattern of laboratory utilization in order to maximize the benefits gained from it. **Methods:** This cross sectional study conducted at the KFMRC, KAU, Jeddah, Saudi Arabia in 2018 on the researchers who visited the behavior research laboratory between October 2018 and December 2018. A structured self-administered questionnaire was utilized to collect the demographic data and preferences of the participants and the pattern of utilization of the behavior science laboratory. The response rate was 100%. The Data were analyzed using the Statistical Package of Social Sciences (SPSS) version 21. **Results:** About 47% of the participants were working at the faculty of medicine (FOM) and about 47% were assistant professor. About 53 had previously conducted researches in behaviors science field. The majority of the participants were interested in memory field (about 57%) followed by the social field (20%). The least attractive field were the nutritional and anxiety (1.4%). The percent of non-medical researchers who had no interest in co-ordination field was significantly higher ($p=0.041$) compared to the medical/paramedical specialists. **Conclusion:** This study shed the light on the relative reduced interest in behavior researches among the academic researchers. There is need for more orientation programs and campaigns to raise the awareness of the importance of behaviors researches laboratories and researches.

Keywords: science, preferences, research, utilization.

1. INTRODUCTION

Behavioral sciences mainly represent the combination of the psychology and sociology sometimes other fields such as communication, anthropology and epidemiology are included. Psychology refers to “the discipline involving the scientific study of mental processes and behavior while sociology refers to a description and analysis of social forces that shape human behavior” (1).

Several studies confirmed the relation between mortality, behavioral and social factors such as tobacco use, poor diet, lack of physical exercise, use of drugs and alcohol as well as sexual behavior. Where these studies emphasized the importance of behavioral and social science to public health practice (2, 3).

It is confirmed without any doubt that the brain is a very complex organ consisting of billions of neurons linked up together in a very complex

network. The brain controls physically the behavior, everything from breathing to personalities, learning and memories (4). One of the valid tools to study behavior is the animal models of different diseases which is considered experimental setup developed in nonhuman species to reproduce humans physiological, pathophysiological, or behavioral features. Either the “theory driven” or the “mechanistic” models could be utilized to study the causes and mechanisms of certain diseases while the “empirical validity models” are utilized to assess various modalities of treatment and the “behavioral similarity models” are utilized to mimic certain disease manifestations (5). When the animals are exposed in the laboratory to practically “realistic situations” they produce behavioral and physiological observable and measurable responses. The settings or procedures used to record these

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responses are usually called “tests” and represent tools to assess and quantify changes associated with anxiety (6).

In their recently published article Ayuob and Balgoon have recommended to establish a preclinical behavioral science laboratory in the academic and research institutes in order to encourage and support the conduction of high quality multidisciplinary researches targeting anxiety and other psychiatric disorders (7). They postulated that such type of laboratories will indirectly participate in improving the health care.

2. AIM

The aim of this study was to determine the preferences of the researchers who utilize the behavioral sciences laboratory at the Preclinical Research Unit and define their patter of utilization in order to maximize the benefits gained from this laboratory.

3. METHODS

King Fahd Medical Research Center (KFMRC) was established at King Abdulaziz University to undertake better ways of addressing the health care related problems to the society. Among the research unites in the center is the Preclinical Research Unit (PCRU) which represents a system of specialty laboratories that helps defining the pharmacological properties of materials and substances and assessing their effectiveness and safety for human use. The unit is concerned with animal behavior, changes in the brain and emotions. Among the PCRU objectives

are to provide researchers with the appropriate environment to discover effective drugs to treat or prevent the common behavioral diseases. The PCRU has a well-equipped laboratory with several devices utilized to assess animal behavior, withdrawal, inflammation and pain as well as emotions and memory of the animal. These parameters are assessed through a set of devices that included; Animal Activity Meter (AAM) to test ambulation in rats and mice, Elevated Plus Maze (EPM) to test anxiety levels in mice and rat and Rota Rod that measure rats balance and co-ordination. Adding to Gait Analysis Treadmill to test rats and mice gait, Animal Treadmill that is utilized to identify the effects of exercise on biological systems as well as many other devices (Figure 1).

This study was approved by the biomedical research ethics committee at the KFMRC. It was a cross sectional study conducted in 2018 at the KFMRC, KAU, Jeddah, Saudi Arabia. The target group was the researchers who visited the behavior research laboratory between October 2018 and December 2018.

A structured self-administered questionnaire was prepared to collect information from the target group. The questionnaire included two parts; the first included question to identify the demographic data of the participants while the second part included question asking about the pattern of utilization of the behavior science laboratory and the participants preferences during conducting the behavior researches. The participants were also asked about the tests and tools they preferred to perform at the laboratory.

The questionnaire was distributed to 15 researchers as a pilot study in order to assess the clarity of the questions and face validity of the questionnaire. Some questions were modified in the light of the researchers feedback about the clarity of the questions. The result of analysis if these responses of the pilot study was not included in the final result.

The questionnaire was then distributed to all researchers visited the behavior research laboratory between October 2018 and December 2018. Seventy researchers took the questionnaire and all of them responded and filled it with a response rate 100%.

Data was entered to the computer and was analyzed using the Statistical Package of Social Sciences (SPSS) version 21. Qualitative data were presented in the form of number and percentage. Chi square test was used for comparison between the qualitative data. P value <0.05 was considered significant.

4. RESULTS

Out of 70 participants, 56 (80%) were from Jeddah, 52 (74.3%) were working at King Abdulaziz university (KAU). Less than half of the participants 33 (47.1%) were working at the faculty of medicine (FOM) and about 47% were assistant professor (Figure 1).

More than half of the participants in this study (about 53%) had previously conducted researches in behaviors science field. When asked about the field in which they are interested the majority (about 57%) chose the memory field followed by the social field (20%). The least attrac-

Figure 1. Examples of devices present at the behaviour science laboratory at the PCRU. A: Elevated Plus Maze, B: EthoVision tracking System, C: Hot cold plate, D, E: passive active avoidance test, F: Radial Maze, G: Running Wheel

Variable	Number N=70	Percentage
Have you already conducted research in the field of behaviour science?		
Yes	37	52.9
No	33	47.1
In which field in the behaviour science are you interested?		
Memory	40	57.1
Social	14	20
Sensation	5	7.1
Depression	4	5.7
Locomotors	4	5.7
Nutritional	1	1.4
Anxiety	1	1.4
Not interested	1	1.4
Regarding the locomotor field, which test/assay do you prefer to conduct?		
Not interested	41	58.6
Total distance moved measurement by video tracking camera (Ethovision)	11	15.7
Running Wheel	9	12.9
Velocity measurement by video tracking camera (Ethovision)	9	12.9

Table 1. Preferences of the participants regarding research in the field of behaviors science.

tive field were the nutritional and anxiety (1.4% each). When asked specifically about the locomotor field and the type of researches they were interested in, about 16% chose measuring the total distance moved by the animal using video tracking camera. It was surprising to found that more than 58% had no interesting in locomotor field at all. (Table 1).

It was noticed that most of participants were interested in conducting researches in the memory and learning area. Almost two thirds (about 63%) of the participants were not interested in conduction of researches in co-ordination field. Among the interested researchers in co-ordination, about 16% preferred to use gait analysis. About 27 and 19% of the researchers interested in conducting researches in memory and learning area preferred to utilized Morris water Maze and Object-Recognition test respectively.

Although half of the participants were not interested in sensation research area, about one third of them were preferred to utilized "Hot/Cold assay" during their researches versus about one fifth preferred to use "Forced swimming test" during working in depression research area (Table 2). More than two thirds (about 67%) of the participants had no interest in ischemia research area, while about 25% of the interested participants preferred to utilize the animal model of cerebral palsy during their researches in ischemia as shown in Table 2.

It was observed that there was no significant difference ($p=0.55$) between the medical and non-medical researchers who have conducted researches in the behavior science (about 53 versus 52% respectively). The most attractive research area among the medical and non-medical researchers was the memory area with no

Variable	Number N=70	Percentage
Which test/assay do you prefer to conduct in co-ordination research area?		
Gait analysis	10	15.7
RotaRod	9	12.9
Vertical Pole test	7	10
Not interested	44	62.9
Which test/assay do you prefer to conduct in memory and learning research area?		
Morris water Maze	19	27.1
Object-Recognition test	13	18.6
Passive/Active Avoidance test	6	8.6
Barnes Maze	5	7.1
Radial Maze	4	5.7
Object-Location test	1	1.4
Not interested	22	31.4
Which test/assay do you prefer to conduct in sensation research area?		
Hot/Cold assay	24	34.3
Tail Flick assay	11	15.7
Not interested	35	50
Which test/assay do you prefer to conduct in depression research area?		
Forced swimming test	15	21.4
Tail suspension	9	12.9
Others	17	24.2
Not interested	29	41.4
Which test/assay do you prefer to use in ischemia research area?		
Animal model of Cerebral Palsy (CP)	18	25.7
Animal model of Middle Cerebral Artery Occlusion (MCAO) / In Vivo	1	1.4
Brain sections in Oxygen Glucose Deprivation (OGD) Model / Ex vivo	4	5.7
Not interested	47	67.1

Table 2. Preferences of the participants regarding the test/assay utilized in the behavior sciences research areas.

significant differences ($p=0.32$) between both of them while the second attractive one was the social research area. The least attractive research area for the medical researchers was the nutritional researches while that of the non-medical was anxiety research area (Table 3).

Large percent of the participants had no interest in the locomotor research area with no significant difference ($p=0.5$) between the medical/paramedical and non-medical researchers.

Results revealed that the percent of non-medical specialists who had no interest in co-ordination field was significantly higher ($p=0.041$) compared to the medical/paramedical specialists. Both Gait analysis and RotaRod were more frequently reported to be utilized by the medical/paramedical specialties compared to the non-medical. On the other hand, there was no significant difference between non-medical specialists and medical/paramedical specialists regarding other behavior research fields (Table 3).

	Medical and paramedical N=45		Non-medical N=35		Test of significance
	N	%	N	%	
Have you already conducted research in the field of behaviors?					
Yes	24	53.3	13	52	Chi-square=0.11 P =0. 55
No	21	46.7	12	48	
In which field of the behavior sciences are you interested?					
Not interested	1	2.2	0	0	Chi-square=6.81 P =0. 32
Sensation	4	8.9	1	4	
Depression	1	2.2	3	12	
Anxiety	1	2.2	0	0	
Memory	26	57.8	14	56	
Social	10	22.2	4	16	
Locomotors	2	4.4	2	8	
Nutritional	0	0	1	4	
Which test/assay do you prefer to use in the locomotor research area?					
Not interested	25	55.6	16	64	Chi-square=3.35 P =0.50
Running Wheel	8	17.8	1	4	
Total distance moved measurement by video tracking camera (Ethovision)	6	13.3	5	20	
Velocity measurement by video tracking camera (Ethovision)	6	13.3	3	12	
Which test/assay do you prefer to use in co-ordination research area?					
Not interested	27	60	17	68	Chi-square=8.35 P =0. 041*
Gait analysis	8	17.8	2	8	
RotaRod	8	17.8	1	4	
Vertical Pole test	2	4.4	5	20	
Which test/assay do you prefer to use in memory and learning research area?					
Not interested	14	31.1	8	32	Chi-square=4.51 P =0. 55
Barnes Maze	2	4.4	3	12	
Object-Location test	1	2.2	0	0	
Morris water Maze	11	24.4	8	32	
Object-Recognition test	11	24.4	2	8	
Passive/Active Avoidance test	4	8.9	2	8	
Radial Maze	2	4.4	2	8	
Which test/assay do you prefer to use in sensation research area?					
Not interested	22	48.9	13	52	Chi-square=0.93 P =0. 627
Hot/Cold assay	17	37.8	7	28	
Tail Flick assay	8	13.3	5	20	
Which test/assay do you prefer to use in depression research area?					
Not interested	17	37.8	12	48	Chi-square=2.26 P =0. 22
Forced swimming test	12	26.7	3	12	
Tail suspension	6	13.3	3	12	
Other	10	22.2	7	28	
In which field do you prefer to conduct in ischemia ?					
Not interested	28	64.4	18	72	Chi-square=0.67 P =0. 69
Animal model of Cerebral Palsy (CP)	13	28.9	5	20	
Animal model of Middle Cerebral Artery Occlusion (MCAO) / In Vivo	1	2.2	0	0	
Brain sections in Oxygen Glucose Deprivation (OGD) Model / Ex vivo	2	4.4	2	8	

Table 3. Effect of specialties of the participants on their preferences in conducting researches in the field of behavior sciences.

5. DISCUSSION

It was noted that the findings during the past 100 years of training and development research have important practical implications, although there is a need for more translations of what we know in order to bridge the sci-

ence-practice gap. As the field of training and development continues to evolve there are several areas where additional research is needed (8). This study aimed to characterize the patten of utilization of the behavioral sciences laboratory at the Preclinical Research Unit and

Figure 2. Demographic characters of the participants

determine the preferences of the researchers who utilize the laboratory in order to maximize the benefits gained from it.

It was noticed, as expected, that the majority of the participants who utilize the behavioral sciences laboratory were from Jeddah, however, about 20% of the laboratory users were from outside Jeddah which indicates role as a highly specialized research center that attracts researchers from many cities as well as many institutes. Among the interesting observations was that the behavioral sciences laboratory was attractive for both the medical and non-medical researchers as well and to the same extent. This observation highlighted the role of this laboratory in specific and the PCRU in general in encouraging high quality researches in the behavior science area. It also increase the responsibility of the team supervising this unit to not only maintain the research interest in the unit but also increase and enhance their participant ion in the research outcome from the unit. It was unexpected to find that large percentage (about 47%) of the participants who utilize the behavioral sciences laboratory were from the assistant professor category who were conducting their researches in order to persuade a promotion in their specialty. On the other hand more than half of the participants were postgraduate students.

Research on human memory has greatly increased in the last few decades. Such notable increase, however, may inconsistently overshadow some unrequited questions in the field of memory research (4). In this study, it was noticed also that more than half of the participants had previously conducted researches in behaviors science field while about 47% were performing researches in this field for the first time. This issue indicates that the behaviors science field became recently attractive to more researchers. Generally, behavior can be considered as any action of an organism that changes its relationship to its environment. Human behavior is a difficult topic because it is extremely complex. Nowadays, studying behaviors particularly human behaviors run under differ-

ent disciplines, where all included under “behavior science” domain (4).

The field of memory was ranked number one among the different research behaviors science fields and was attractive to about 57%. This issue could be explained in the light of the prevalence of the diseases affecting memory either worldwide or in the Arabic region. In a recent study, the prevalence of mild cognitive impairment and dementia in Saudi Arabia, which are among diseases affecting the memory, using Montreal Cognitive Assessment were 38.6% and 6.4% respectively in 2018. This is considered in the upper range compared to the developed and developing countries (9).

The least attractive field for the participants researchers in this study, was surprisingly the anxiety. It was expected that conducting researches on anxiety represents a high priority for the researchers because of its prevalence on the international and national level. In an relatively recent Saudi study conducted on gastroenterology patients, the prevalence of depression symptoms (44% and 32%) and anxiety symptoms (34% and 24%) were reported to be relative higher in both females and males respectively (10). This observation raises the issue of formulating a national research plan that highlights the research priorities of the kingdom and continuously announce this plan to all researchers and faculty in the academic and research institutes.

Glanz and Bishop concluded that effective public health programs to help people preserve and improve health, decrease disease risks, and accomplish illness regularly need behavior change at many levels (3). The most successful public health programs and initiatives are based on an understanding of health behaviors and the contexts in which they occur. Strategic planning models provide a structured framework for developing and managing public health interventions and improving them through evaluation.

Animals change their behavior to allow them to deal with stressors such as infection, satiety, or social and environmental changes. This behavior is often stable and expected but cannot be measured at scale because of the labor necessary to physically monitor large numbers of animals constantly. The extensive results of laboratory studies of the behavior of animals under the human level are also existing. The use of this material often meets with the dispute that there is a fundamental gap between man and the other animals and that the findings of one cannot be extrapolated to the other (11, 12). This issue could be behind the presence of large percentage of the participants who lack the interest in different fields of the behavioral science.

6. CONCLUSION

This study showed the light on the relative reduced interest in behavior researches among the academic researchers, although the presence of the evidence of its importance in providing information help in designing intervention program and strategies in order to modi-

fied risk behaviors and decrease the rate of morbidity and mortality and increase healthy habits. There is need for more orientation programs and campaigns to raise the awareness of the importance of behaviors researches laboratories and researches.

- **Author's contribution:** Each author gave substantial contribution to the conception or design of the work and in the acquisition, analysis and interpretation of data for the work. Each author had role in drafting the work and revising it critically for important intellectual content. Each author gave final approval of the version to be published and they agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.
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