CLASSROOM APPROACHES TURNED INTO REALITY, USE OF SIMULATORS VS. EXPERIMENTAL ANIMALS BEFORE A REAL EVENT: COVID-19

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Abstract

Students learning Pharmacology in the Chemistry and Medicine Colleges were asked for their opinion regarding the use of simulators in the teaching-learning of Pharmacology versus the use of experimental animals. This reflective exercise allowed detecting positions pro and against it; one of the main reasons for refusing to use experimental animals was the pain inflicted to them and the slaughter of the specimens. The students were also asked if, in view of a real and indispensable need such as quality tests (safety and pharmacological efficacy) and the development of new drugs, simulators would be an efficient tool to avoid using experimental animals. Most of the chemistry students agreed that a simulator is not enough for such a task, while the medical students were divided between those who agree with the use of experimental animals and those who prefer to use simulators before using living beings. In this work, the original approach "to use simulators or to use experimental animals" is presented, contrasting it with a prevailing need: a vaccine to protect the human population from Covid-19.

This article presents the approach, the argued answers of the students and the evidence published in scientific articles of the period 2019-2020 in which animals or parts of them were used in the development of a safe and effective vaccine.

Keywords: Simulators, experimental animals, preclinical studies

1. INTRODUCTION

In the classrooms of Pharmacology of the Medicine (Carrillo, 2000) and Chemistry Colleges (Vazquez A., 2019) of the National Autonomous University of Mexico (UNAM), various tools derived from the Internet have been incorporated, the available technology has been used to perform everyday tasks, from presentations, school reports, smart charts, etc., however the use of simulators to replace the use of animals, is a very

important step and involves changes in educational planning. The entry of simulators in the faculties was not simultaneous, in the faculty of Medicine has several years, while in the faculty of Chemistry the assessment of simulators began last year. The professors of the School of Chemistry, who participated in the evaluation of the simulators, informed about the benefits and limitations of these, as well as the impact on the students' learning, recognizing that the experimental rigor is one of the richest educational experiences that led to the professional exercise has allowed us to continue in the advance of diverse areas. An exercise carried out in the classroom was the proposal of what to do in the case of the development of new medicines, the question was directed to the choice of tools, being able to select between the use of simulators and the use of experimental animals. The great majority of the chemistry students who participated in this exercise were inclined towards experimentation, because they considered that the simulators they have known are limited to reality. Medical students were divided into two positions, one group preferred to use the simulator and another group chose to use experimental animals to perform the task at hand (develop a drug). This approach was made in the classroom as a reflection exercise, when the simulators started to arrive to the Faculties, the posture adopted by some professors was to banish the experimental sessions, maybe with some good reason, as could be the financing of the rooms, the supply of consumables, of laboratory animals, of qualified teaching staff for experimental teaching, etc., the interest in the use of simulators for teaching, has been explored since then in several aspects.

Officially, in the year 2019 the World Health Organization announced the discovery of a new type of coronavirus (Covid-19) in a region of China, later it was reported that Covid-19 was present in populations of other countries, informing us day by day of the number of infections and deaths by region. Faced with this unfortunate event, many instances have invested human and material resources in a race to obtain a vaccine.

In this work, it is presented the revision of a data base search to know approximately how many writings declare to have used complete experimental animals or parts of them, to investigate some aspect of the Covid-19 and to contribute with information that allows the development of an effective and safe vaccine.

2. METHODOLOGY

The opinions of the students of Medicine and Chemistry regarding the use of experimental animals versus the use of simulators were taken up again and as part of a reflection exercise, we looked for evidence on the use of experimental animals for the development of an effective and safe vaccine. For that purpose, databases were consulted, and key words were used, with this information tables were elaborated indicating the consulted database, the key words used and the numerical result of the searches. Later, based on the findings, an analysis was made, and we returned to the original classroom approach.

3. RESULTS

Table 1. Number of experimental reports that used experimental animals or part of them, shows on one hand the database consulted, the key words entered, and the results obtained.

Table 1. Number of experimental reports that used experimental animals or part of them

Source	Keywords	Document Number
PMC	Experimental rats, Pre-clinic studies development Covid-19 Vaccine	16
	Experimental animals, Covid-19 Vaccine	154
	Preclinics studies, AND mouse OR rats OR dog's cells AND vaccine AND Covid-19	800
	Laboratory animals AND vaccine AND Covid-19	1966
	vaccine covid-19 AND preclinical studies	1040
Google in Spanish	animales AND vacuna AND Covid-19 AND publicaciones indexadas	42
	animales AND usados AND vacuna Covid-19	804

The table above shows the number of articles published, according to the keywords entered in the search engines PMC and Google academic, the number of documents grows from a few to thousands, this search can be extended, but it is not the case, the objective here is to contrast a real event as the urgency to have a safe and effective vaccine against Covid-19 and verify whether or not experimental animals are used. The findings show that cellular lineages, organs, tissues and whole animals are required, all of them important in the previous phases to the clinical stage. In the reports, they talk about two qualities that the vaccine must have: safety and efficacy (Garcés & Gutiérrez, 2012), the first one refers to the fact that the collateral or secondary effects are minimum, while the second one talks about the fact that it fulfills its purpose, in this case, that it protects against Covid-19.

The students of the Faculties of Chemistry and Medicine who participated in the previous studies declared their argued preferences (use of animals or use of simulator) in *Figure 1. The use of experimental animals in the teaching of Pharmacology*, shows that the reasons for the use of experimental animals The simulator is not enough (9%), the simulator is wrong (3%), the simulator is of little reach (2%), it could be my job in the future (3%), to reduce side effects in people (3%), I do not trust the simulator (6%), I did not understand the simulator (3%), the simulator is very simple the reality is different (12%), I did not like the computer practice (15%); in contrast to the reasons for not using experimental animals: The animals suffer a lot, they don't survive at the end of the experiment (11%), I don't like rodents, I can't stand to catch rats (14%). Figure 1. Use of experimental animals in the teaching of Pharmacology, shows that students of Chemistry prefer the experimentation with animals over the simulators.

Figure 1. Use of experimental animals in the teaching of Pharmacology

Medical students were divided between using simulators and using experimental animals, their balance is balanced, although the figure is not presented.

The original approach was what to do in the case of the development of new drugs, the question was directed to the choice of tools, being able to select between the use of simulators and the use of experimental animals, attending to reality we can learn that technology as educational simulators are a great help, but tools as valuable as experimentation should not be eliminated. At this very moment, many laboratories around the world are working hard on the development of a safe and effective vaccine, using experimental animals to obtain as much information as possible before reaching the clinical phases, thousands of reports support this (Table 1). The research complies with robust ethical considerations to ensure good animal management, it must be understood that the challenges in the technological era demand constant training, the careful choice of knowledge and how to acquire it, in this era it is not about changing because it is a fad, but to preserve everything that is useful. For teachers it implies a transformation, from giving the central role to students and training them to advise, correct, suggest, encourage imagination, creativity and collaboration among others.

4. CONCLUSION

Technology is here to stay, but it does not mean replacing everything, it is about preserving what is useful. Students should know all the tools possible, so they can solve the challenges that await them. Reflecting in

class is enriching, here a theoretical approach was shared: using animal experimentation or simulators, the evidence shows that animal experimentation is indispensable to be able to move on to the clinical phase and elaborate a safe and effective vaccine; therefore, the answer is to use everything we have available to solve our problems, the figure who contributes directly in this work is the professor, who must also be in constant preparation to achieve his task

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