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Discussion Points:

- Science is for everyone. Conscious consideration of inclusivity is critical to creating an equitable workplace.
- Support networks of women in science promote a sense of community and empowerment.
- Historically, gender bias has limited academic opportunities for women as compared to men.
- Creating professional development and leadership programs for women may help reduce the gender gap in science.

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ABSTRACT.

Women have participated in science since the earliest of times. However, their valuable contributions are not as widely acknowledged throughout our history and women still face several barriers throughout their professional career. We developed and hosted a mid-day Women in Science seminar by students and for students. The main goal was to promote ways to involve more women students in research activities and to strengthen the scientific community within our medical school. The workshop consisted of three main sections where we shared relevant statistics, resources, and strategies among a community of students interested in science. At the end of the workshop, participants shared their insights proving the necessity and utility of this type of events to strengthen science as an inclusive field.

Key Words: Gender; Bias; Women; Science; Medicine; STEM.

THE EXPERIENCE

Gender bias is an "unfair difference in the way men and women are treated."[1] This phenomenon has many different presentations and extends to work environments where men are considered over women for scientific tasks.[2-4]

Gender bias affects women in hiring decisions, perceptions of the quality of their work, research publications, peer-review processes, citation patterns, and leadership positions, among others.[5-9] Barriers such as gender wage gaps, sexual harassment, and maternity and paternity policies often prevent women from growing in their professional careers, particularly in science.[10-14] Studies have shown that gender bias begins early in education and has deleterious effects throughout many aspects of academia[15]. It affects grading, mentoring, and letters of recommendation, which could certainly affect the progress of women in science.[16, 17]

Addressing this issue is key to pursuing gender equality in science, a problem that women have fought so hard to overcome. Thus, we designed, developed, and hosted a mid-day research-focused workshop to highlight the gender gaps in science, and to provide information on research opportunities available for medical and clinical biochemistry students. This workshop aimed to achieve the following:

- Provide information about ways to get involved in research as medical and clinical biochemistry students.
- Instill confidence in students by providing examples of women with research experience
- Foster a sense of community in our school among women in research
- Motivate and inspire women to pursue their scientific abilities
- Increase women's participation in research activities at our university

IMPLEMENTATION OF THE WORKSHOP

The workshop was a hybrid event where students were invited to attend in person or online. Although the invitation was open to everyone regardless of gender, all of the 50 participants identified themselves as women. The workshop was divided into the three following phases:

Phase one: History of women in science

The first speaker was a fifth-year medical student from our university with previous research experience. Her session started with an implicit association exercise to assess unconscious bias in the audience. She continued with a talk entitled "Women in Medical Sciences Throughout Time" This talk presented women who have made essential contributions in the field of medical sciences. It included characters such as Agnodice, an important figure of Ancient Greece,[18] and the first woman to be acknowledged as a gynecologist; Doctor Alice Hamilton, first woman to become a faculty member of Harvard University;[19] and Nobel Prize winners Doctors Emmanuelle Charpentier, Jennifer

Doudna, and Rita Levi-Montalcini among other scientists and doctors.[20] The purpose of this introduction was to show how women have been actively participating in medicine from ancient times to the present and that their contributions have had a part in global and human development.

Phase two: Current State of Affairs

The second speaker was a first-year clinical biochemistry student from our institution with previous research experience. The speaker focused on the National System of Researchers or SNI, a government-led program established in Mexico, in which scientific researchers across the country subscribe to receive funding for their projects and apply for academic positions. According to data provided by SNI, only 37.2% of Ph.D. researchers are women.[21] Afterwards, the speaker described some of the structural barriers that could explain the disparity between men and women in professional settings; such as the theory of the "glass ceiling and the sticky floor", which addresses the challenges women face for being promoted in science, technology, engineering, and math (STEM) careers, as well as the increasing difficulty for securing a grant in research.[22-25] At the end of this presentation, we conducted an activity in which the audience was encouraged to write down thoughts and ideas to improve women's situation in science in the present and near future **(Figure 1)**.

Phase three: Leadership and empowerment seminar

The third speaker was a fourth-year medical student from our institution with previous research experience on the field of Psychiatry. The talk focused on empowering and instilling confidence in leaders, promoting empathetic and respectful communication, and suggesting ways to establish boundaries at the workplace. We continued with a pre-recorded interview with Sonia Hernández-Díaz, MD, PhD, professor at Harvard T.H Chan School of Public Health. Her main area of research is Pharmacoepidemiology of Women's Health. She spoke about the difficulties she faced in academia and shared insights on how she found her passion. We also displayed a video of women researchers around the world giving advice to inspire young students who are interested in research.

We ended the workshop with a question-and-answer panel in which the participants and the presenters could share their doubts and experiences. Participants bounced ideas off one and another, and shared advice based on personal experiences and on how they found research opportunities within our university **(Figure 2)**. Some of the attendees were already involved in research activities, therefore their input was of great importance to younger students who did not know where to begin.

RECOMMENDATIONS AND LESSONS LEARNED

This workshop accomplished its objective of motivating women to pursue and embrace science as a career. The participants were asked about their opinions and feelings regarding the workshop, they

described it as an inspiring, deep, and informative experience. Here we propose specific actions to continue to address gender issues in science:

- *Raise awareness, create, and participate in inclusive events*

The extended discussion following the presentations offered different ideas and possibilities for future projects. We extend the invitation to institutions to carry out and implement workshops that promote the inclusion of minorities and educate the majority. We hope these activities continue to generate interest in students and help everyone consider ways to move forward in an inclusive manner in today's science world.

- *Increase women representation in science and promote gender-neutral mentoring*

According to the United Nations Educational, Scientific, and Cultural Organization (UNESCO), less than 30% of researchers worldwide are women.[26] We consider increasing women in high leadership positions leads to fairer decision-making and contributes to motivate more women to get involved in these areas. To achieve this, we must first recognize the women who have participated in science through the centuries and acknowledge their contributions; illustrating more women in books, scientific media, and even television communicates diversity and raises awareness in young girls on their importance for scientific development. As for current research, we support the concept of gender-neutral mentoring to help account for barriers such as gender bias on grants and scholarships for the funding of research projects led by women.

- *Share and learn from each other*

We suggest women medical students look for support in other women leaders they look up to including older students, research trainees, professors, specialists, and researchers. We recognize it is possible to reach better ideas brainstorming as a group, discussing, and proposing solutions. Forming support networks of women, incorporating inclusive language in science, and promoting a sense of community that empowers women are actions that contribute to make a change **(Figure 3)**.

- *A job for everyone*

This is not only a job for women, but a job for *everyone*. We must all be conscious, inclusive, and account for everyone's needs to bring equity into the workplace and achieve better results that in the aggregate benefit everyone.

CONCLUSION

Is it hard to be a researcher? Undoubtedly yes. Should we try despite the difficulties we are supposed to overcome? Definitely. This workshop made us reflect that although we have made a lot of progress over the past few years, we still have a long way to go to close the gender gap in science. The impact

of the event on the women of our institution proves the efficacy and the need for this type of intervention to improve the development of women in science.

PARTICIPANT EXPERIENCES AND PERSPECTIVES

"This workshop was a genuine experience. It was a space created by women for other women, which made me reflect upon the value and importance of us women helping each other, highlighting our skills, and reminding us that instead of competing, we can be allies. Without doubt I could say that more than one of us went home wishing to become a woman in science." Claudia Ramírez Mata, first-year Clinical Biochemistry student.

“Going to the workshop was enriching. I felt comfortable and safe, it was a very empowering environment. I loved that the speakers encouraged us to participate and even share our own experiences. It made me realize that there are many paths to follow in the world of science. They gave us advice to start doing research, and most importantly, they made us feel connected with other women as there is still work to do to achieve equality and layer a foundation for future events.” Lourdes Gil Flores, fourth-year Medical student.

“Women in science was a delightful event, full of emotions, knowledge and women empowerment. At the beginning it was quite frightening to listen to data about discrimination against women and gender inequality in professional life. But as soon as the event went on, there were suggestions of what we can do to be part of the change, sharing of testimonies, and support from the whole auditorium. By the end of the event I was sure that our generation can make a change, that there are people willing to help and redirect to the correct areas to seek change, and that with small actions we can start to eliminate the injustices that exist nowadays. Honestly it was an event that I wish everyone, not just women, would attend.” Daniela Ortega Mata, sixth-year Medical student.

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SUMMARY - ACCELERATING TRANSLATION

Mujeres y ciencia: el horizonte en investigación

Las mujeres han participado en la ciencia desde el inicio de los tiempos. Sin embargo, sus logros no son tan vastamente reconocidos dentro de la historia. Actualmente, las mujeres enfrentan barreras asociadas al género cuando se trata de avanzar en su carrera profesional. Debido a esto, decidimos crear un espacio dirigido a estudiantes para hablar de la historia de la mujer en la ciencia y difundir estrategias para fortalecer la comunidad de mujeres en investigación. Durante este taller se compartieron estadísticas, experiencias personales y consejos sobre la trayectoria de distintas mujeres que se desarrollan en campos científicos alrededor del mundo. Al finalizar el taller, la retroalimentación de las participantes puso en evidencia la utilidad y necesidad de este tipo de espacios para motivar y enriquecer la comunidad científica de mujeres.

FIGURES AND TABLES.

Figure 1. Audience Participation Proposing Ways to Address Gender Bias at the University.

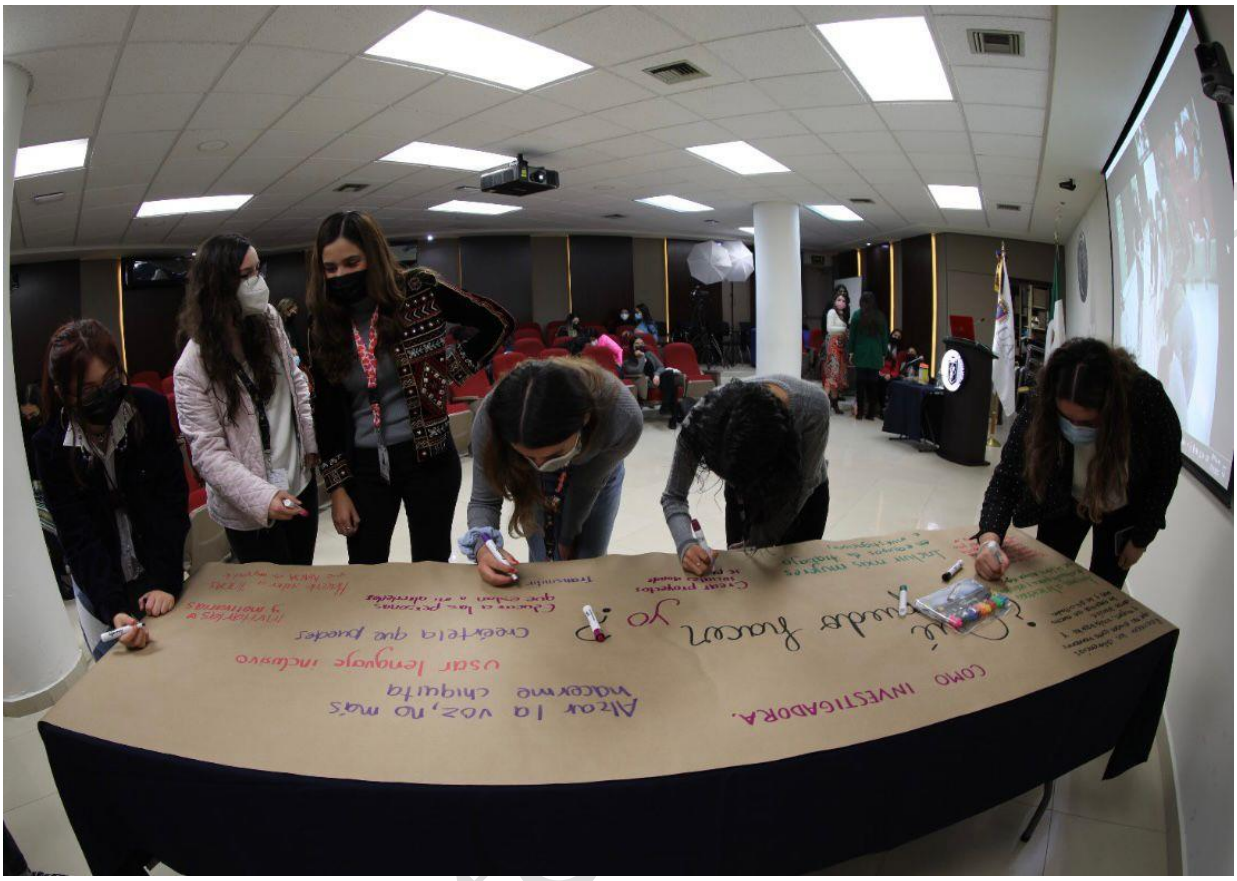

Figure 2. Round Table

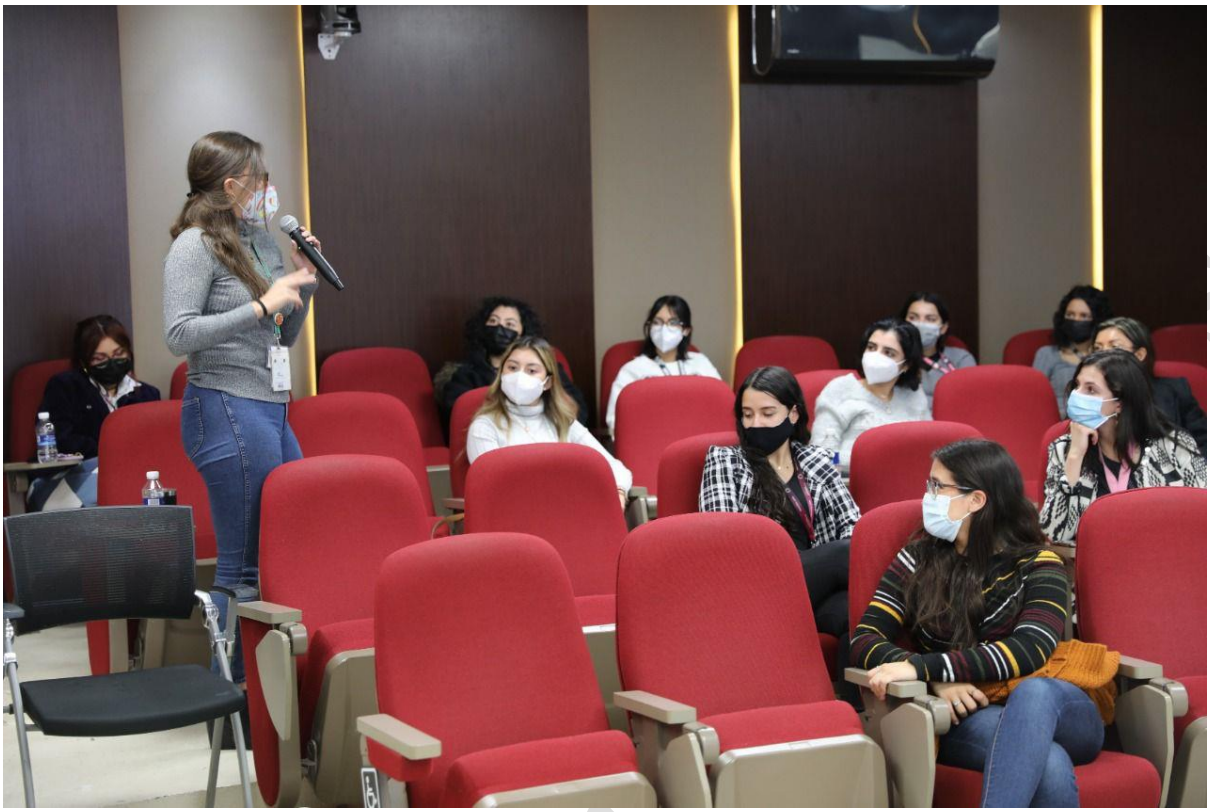

Figure 3: The Seminar