Knowledgeand Perception of Medical Students to Stem Cell Research in Delta State University, Abraka

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ABSTRACT

Introduction. Stem cells are undifferentiated cells capable of self-renewal and differentiation into specialized cell types. This study aims to evaluate the knowledge and perceptions of medical students regarding stem cell research at Delta State University, Abraka.

Materials and Methods: A structured questionnaire was administered to 384 medical students (193 males and 191 females) in their second and third years. The questionnaire included demographic data, knowledge assessment, and perception-based questions. Data were analyzed using the Statistical Package for the Social Sciences (SPSS) software, and the results were presented in simple frequency distribution and percentages.

Results: About 48.4% of respondents demonstrated a good understanding of stem cell research. A majority expressed interest in research related to stem cells, particularly umbilical cord blood stem cells. Notably, most participants acknowledged the disadvantages of embryonic stem cell transplantation, including the risk of tumor formation, while recognizing that stem cells could enhance the duration and quality of life for healthy individuals.

Conclusion: The findings indicate that medical students at Delta State University, Abraka possess moderate knowledge of stem cell research, coupled with a strong interest in further education on the topic.

Keywords: Stem Cell, Medical Students, Abraka

INTRODUCTION

Stem cells are undifferentiated cells with the unique ability to self-renew and differentiate into specialized cell types, making them essential for tissue regeneration throughout an organism's lifespan.[1,2]These cells are vital in replenishing dying cells and regenerating damaged tissues.[3] Recent advancements in stem cell research suggest their potential to revolutionize medicine by providing cures and treatments for various diseases,[4] including cancer and cardiovascular disorders, as well as enabling stem cell-based replacement therapies.[5]

They are present in all multicellular organisms and are categorized based on their origin and potency. The two primary types of mammalian stem cells are embryonic stem cells (ESCs) and adult stem cells.[6]Embryonic stem cells, derived from the inner cell mass of the blastocyst, are pluripotent, capable of differentiating into nearly all cell types. Their limitless growth and differentiation potential make them a valuable resource for regenerative medicine, though their use raises ethical concerns.[7,8] In contrast, adult stem cells, found in specific tissues such as bone marrow and adipose tissue, are multipotent or unipotent, with a more limited differentiation capacity but fewer ethical controversies surrounding their application.[9,10]

Stem cells can be sourced from various tissues, including umbilical cord blood, amniotic fluid, brain tissue, skin tissue, and adipose tissue.[11] They can be directed to differentiate into specific cell types, offering a renewable source for replacing damaged or diseased tissues. This capability holds promise for treating conditions such as spinal cord injuries, stroke, heart disease, diabetes, arthritis, Parkinson's disease, and Alzheimer's disease.[12]

Despite their immense potential in advancing medical science, awareness and understanding of stem cell research vary significantly across populations and professional groups. Studies have highlighted gaps in knowledge and differing perceptions among healthcare providers and medical students.[13] For instance, researchers have found that higher levels of knowledge about stem cells correlate with more favorable attitudes toward their use in research and therapy. These findings showthe importance of targeted educational initiatives to bridge knowledge gaps and foster positive perceptions. Due to the vital role of stem cells in regenerative medicine and their potential to transform healthcare, this study aims to assess the knowledge and perceptions regarding stem cell research of medical students at Delta State University, Abraka, Nigeria.

MATERIALS AND METHODS

Study Design: The study employed cross-sectional design to evaluate knowledge and perceptions of Medical students regarding stem cellsand its applications. It was conducted in Delta State University, Abraka, Nigeria. About 384 medical students in their second and third years participated in this study.

Method of Data Collection: Data was collected using a self-administered questionnaire developed by the researcher. The questionnaire was designed based on a thorough review of existing literatures on stem cell and their medical applications.[14,15] It consist of sections on demographic information, knowledge assessment and perception-based evaluation.

Data Analysis: The collected data were analyzed using Statistical Package for Social Sciences (SPSS) version 25. Descriptive statistics were employed to summarize demographic characteristics and knowledge

scores. Inferential statistics, including chi-square tests, were used to explore associations between demographic variables and knowledge levels.

Ethical Consideration: Ethical approval for this study was granted by the Department of Human Anatomy and Cell Biology, Faculty of Basic Medica Sciences, Colege of Health Sciences, Delta State University (DELSU/CHS/ANA/2020/40). All participants provided informed consent prior to the commencement of the survey.

RESULTS

The analysis revealed that 48.4% of the respondents demonstrated good knowledge of stem cells, while about 51.6% indicated they did not possess such knowledge. Despite this, a significant majority (82.8%) expressed interest in developing their understanding of stem cell research

Regarding specific knowledge statements, only 44.3% of participants correctly identified that stem cells can develop into various types of cells, while a substantial majority (87.5%) erroneously believed that umbilical cord blood stem cells are classified as embryonic stem cells. Additionally, only a small percentage (27.3%) recognized that adult stem cells are also referred to as somatic stem cells, and just over one-third (34.9%) acknowledged that embryonic stem cells can form any cell type in the body including the placenta. In contrast, a high level of awareness was observed regarding the sources of adult stem cells, with 81.8% correctly identifying sperm and eggs as such sources (Table 1)

Table 2: reveal varied perspectives among respondents: About (70.3%) did not express concern that stem cell transplantation might lead to unethical practices such as killing for the benefit of others, a notable portion (29.7%) did not agree. Furthermore, only a small minority (2.6%) believed that all research on embryonic stem cells should be prohibited by the government, while an overwhelming majority (97.4%) disagreed with this stance. Regarding moral considerations, only 22.9% felt that embryonic stem cell research is immoral due to its association with embryo destruction, whereas a substantial majority (77.1%) did not share this belief.

Regarding the efficiency of umbilical cord blood stem cell transplantation compared to bone marrow transplantation, 43.5% disagreed with the statement that umbilical cord blood stem cells are less efficient, while 20.6% strongly agreed. A significant number of participants (43%) disagreed with the notion that embryonic stem cell transplantation has serious disadvantages due to tumor formation; however, 16% strongly agreed with this concern. A substantial majority 62% recognized that umbilical cord blood stem cells have a lower risk for graft-versus-host disease compared to other types of stem cells, while 42% strongly agreed. When asked about the importance of benefits derived from stem cell research 46% strongly agreed that these benefits are crucial, while 35% also agreed. Moreso, 40% of respondents strongly agreed that stem cells can prolong both the duration and quality of life for healthy individuals.

Figure 1: showed knowledge of respondents on the therapeutic application of stem cells. This figure presents findings on respondents' perceptions regarding the therapeutic applications of stem cells, including their beliefs about stem cells being used to treat illnesses and their potential to be induced from normal skin cells.

Figure 2: showed the distribution of respondents across various departments

within their institution, highlighting areas such as Anatomy and Nursing.

Figure 3: highlightsthe gender distribution among the respondents.

Figure 4: depicts the religious affiliations of participants, showcasing the diversity in beliefs among respondents.

Table 1: Knowledge of Stem Cell among Respondents

Knowledge	Frequency	Percentage (%)
Do you have knowledge of stem cells? yes no	186 198	48.4 51.6
Stem cell is sample cell in the body that is able to develop into any one of various kinds of cell yes no	170 214	44.3 55.7
Would you be interested in developing your knowledge about stem cells? yes no	318 66	82.8 17.2
Adult stem cells are also known as somatic stem cells. yes no	105 279	27.3 65.1
Embryonic stem cells are capable of forming any cell type in the body including placenta yes no	134 250	34.9 65.1
Umbilical cord blood stem cells are embryonic stem cells yes no	336 48	87.5 12.5
Sperm and eggs are a source for adult stem cells. yes no	314 70	81.8 18.2

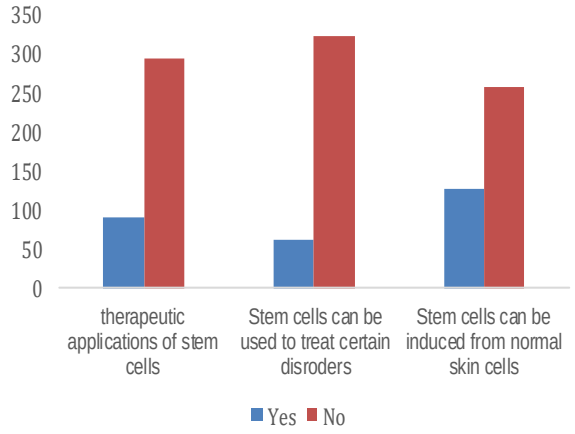

Figure 1: Knowledge on the Therapeutic Application of Stem Cell

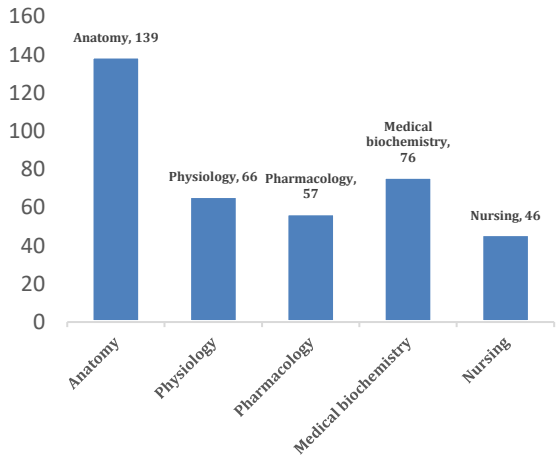

Figure 2: Distribution Showing the Department of Respondents

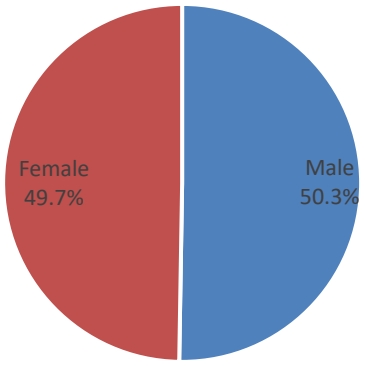

Figure 3: Gender Distribution of Respondents

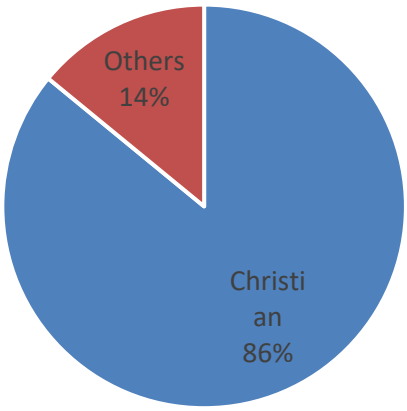

Figure 4: Religious Status of Respondents

DISCUSSION

The findings of this study provide significant insights into the knowledge, attitudes, and perceptions of medical students in Delta State University regarding stem cell research. The demographic distribution aligns with previous studies that highlight the importance of educational background in shaping the understanding and perception towards emerging medical technologies.[2]

The findings revealed that 48.4% of respondents had prior knowledge of stem cell research. For instance, many respondents did not recognize that adult stem cells are also known as somatic stem cells or that embryonic stem cells can differentiate into any cell type, including placental tissue [2]. These results were in contrast with those of Tork et al. (2018), who reported that only3 1.2% of their respondents had knowledge about stem cells, and Mashal et al. (2020), who found that 60.2% were aware of stem cell concepts and agreed on their definitions[2,16]. There was a strong interest among respondents in developing their understanding of stem cell research. This aligns with findings from Khali and Sharshor (2016), who noted a similar desire for education among healthcare providers and Mashal et al. (2020), who noted a similar willingness among their participants to increase their knowledge[17,16].

The current study also indicated various perceptions among respondents regarding the therapeutic applications of stem cells. Most participants disagreed with statements suggesting that stem cells could effectively treat conditions such as Parkinson's disease, Alzheimer's disease, cancer, diabetes, or heart diseases, and that they could be induced from normal skin cells through genetic manipulation. This finding contradicts Mashal et al. (2020) who reported that most respondents believed in the therapeutic potential of stem cells [16].

Regarding ethical concerns, the majority of respondents disagreed with statements suggesting that stem cell transplantation might lead to unethical practices such as killing for the benefit of others or prohibiting embryonic stem cell research due to moral objections. However, many agreed that a blastocyst should be afforded the same respect as a living human adult and supported the notion that stem cell transplantation should be widely practiced. These findings were consistent with that of Jee *et al*. (2015) while Mashal et al. (2020) noted uncertainty among their participants regarding concerns about ethical implications.[18, 16]

Additionally, most respondents disagreed with the assertion that umbilical cord blood stem cell transplantation is less efficient than bone marrow transplantation but expressed confidence in the potential benefits of stem cell research while acknowledging concerns about possible risks associated with embryonic stem cell transplantation, such as tumor formation. The acknowledgment that umbilical cord blood stem cells have a lower risk for graft-versus-host disease than other types of stem cells is particularly noteworthy and aligns with findings from recent literature highlighting this advantage[19] (Abo-Baker Mohamed & Elsaid, 2021). Furthermore, they

recognized that stem cells could prolong both the duration and quality of life for healthy individuals.

In conclusion, this study highlights critical gaps in knowledge about stem cell research among medical students while demonstrating a strong interest in further education on this subject. The discrepancies between our findings and those from previous studies shows thenecessity for targeted educational interventions aimed at enhancing understanding and promoting informed perception towards stem cell applications in research and clinical practice. Future studies should focus on developing effective educational programs that address these gaps and promote ethical considerations within the context of advancing medical technologies

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