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Attitudes of Batswana towards Stem Cell Technology as an Alternative Therapy in Botswana

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Abstract: ***Botswana is lagging behind in active participation in stem cell research. The research is yet to take off in the country. In order for stem cell research to be established in Botswana, the people of the country have to accept the research as affording a viable therapy alternative to conventional medicine. This study aimed to evaluate and analyse attitudes of the people of Botswana towards the establishment of stem cell research in Botswana. A survey study was conducted to examine public opinion towards stem cell research in Botswana. The study was conducted in Gaborone through the distribution of survey questionnaires. A total of 107 responses were received from these surveys. It was found out that most of the respondents favoured stem cell research. Thirty-nine percent (39%) (n = 42) approved the indiscriminate use of embryonic stem cells while 42% (n = 45) approved the use of these cells under specific circumstances. Only 19% (n = 20) were against the use of embryo-derived stem cells regardless of any prevailing circumstances. The benefits of the research far outweighed moral ethics which was the reason for the support of the research. Moreover, some people with strong religious convictions showed support for the research as it offers great benefits. This study is important because regulatory policies and legislation governing the research cannot be established without considering public opinion.***

Keywords: Stem cells, ethics, stem cell research, legislation, Botswana

1. Introduction

Research has shown that chronic diseases kill more people and are more prevalent in developing and low income countries (Folch *et al*., 2003; Hofman *et al*., 2005). The clinical potential of human embryonic stem cells in the treatment of different medical conditions continues to be investigated. Recently, transplanted stem cells from a donor with a mutated HIV receptor were shown to keep HIV in remission in a patient who had undergone stem cell transplantation (Gupta *et al*., 2019; Hütter *et al*., 2009). Stem cells are expected to provide future treatment for conditions such as heart diseases (Rubart and Field, 2006), diabetes (Otonkoski *et al*., 2005), Parkinson's disease (Sonntag *et al*., 2005) and many others. However, stem cell research remains a very contentious issue globally. Religious opinions and lack of regulatory legislation in some countries are some of the major hindrances to the research. Since their isolation, debates have erupted surrounding the use of embryo-derived stem cells (Shepherd *et al*., 2007). Indeed, stem cell research has been regarded by some as the most controversial biotechnological topic of our times (Nielson, 2008).

The discovery of stem cells has not only brought questions and uncertainty regarding their use, but has also prompted some very interesting debates about life (National Research Council, 2001), especially about when life begins. Even though debates between scientists and legislators continue, the opinions of the lay people remain the most important in stem cell research. Opinions of lay people and members of the public are crucial because they can restrain or promote scientific and technological developments (Miller, 1983). This is because attitudes of the public can catch the interest of legislators and therefore have profound impact on policies being developed and priorities being set. Funding remains a critical issue that is not unique to smaller nations such as Botswana. In the United States of America, federal funding for stem cell research has been tightly regulated over the years. One of the concerns regarding the use of embryo-derived stem cells is the possibility that pregnant women may be offered in exchange for their embryos (Dickenson, 2002). This can lead to malpractices that will diminish the credibility of the field (Craft, 2001).

Despite all the scientific, ethical and financial challenges that stem cell research is faced with, there is an increase in the general acceptance of the research. In the USA, where stem cells were first isolated (Thomson *et al*., 1998), the level of support for stem cell research rose from 40% in 2002 to 65% in 2010 (Nisbet and Markowitz, 2014). In Europe, 65% of people approved stem cell research in 2010 and 2005 respectively (Gaskell *et al*., 2011; Gaskell *et al*., 2006).

This study aimed to investigate public opinion towards stem cell research in Gaborone, Botswana. The study further examined the reasons behind those opinions among respondents. This study is the first of its kind in Botswana and will create an informed gateway to the establishment of stem cell research in Botswana.

2. Methods

This study was conducted in Gaborone (24°39′29″S 25°54′44″E) in the South East of Botswana (Figure 1). Gaborone is the capital city of Botswana.

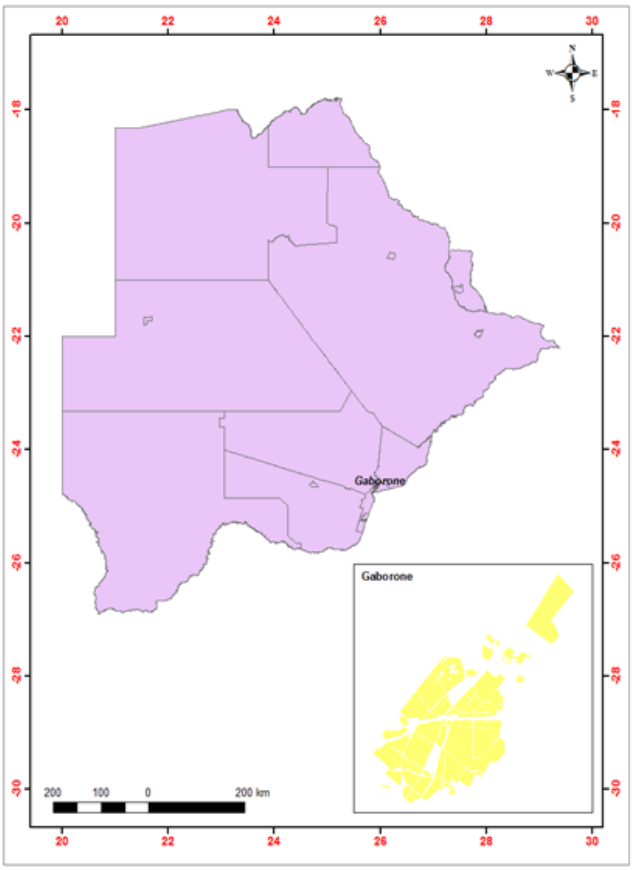

Figure 1: A map of Botswana showing the study area

2.1 Survey Procedure

In this study, questionnaires were used to collect information from respondents. A total of 107 respondents were involved in the survey. Respondents were selected in a purely random manner. The identities of the respondents were not recorded. Respondents were ordinary citizens of Gaborone who were willing to partake in this study.

Approval or Non-approval
Each of the respondents was provided with the following statement;

'Stem cells are derived from human embryos that are about a week old. These cells are special because they have the potential to alleviate certain diseases such as HIV/AIDS and cancer. Stem cells are derived from excess embryos that are donated by patients undergoing assisted reproduction (IVF)'

Based on the information provided to them, respondents were then asked to select which among the statements below best reflects their opinions on the use of embryo-derived stem cells for therapy. 'Approve under specific circumstances' related to respondents who were not against research, but approved the research conditionally. Many of the respondents supported the research but only after proper legislation governing the research has been developed.

Table 1: Opinion choices of respondents on the use of stem cells derived from human embryos

	Respondents' opinion choices
1.	I approve the use of embryo-derived stem cells for research and therapy
2.	I approve the use of embryo derived stem cells under specific circumstances
3.	I do not approve the use of embryo-derived stem cells under any circumstances

*It is worth noting that because there are no laws or legal policies that govern stem cell research in Botswana, the respondents' choices, as explained to the respondents themselves, are proposed for when there is such legislation in Botswana.

2.2 Religious statuses

In order to relate the views of the respondents to their religious statuses, respondents were also asked if they were religious or not. 'Religious' in this context refers to their belief in the existence of any deity whom they are devoted to. No respondent was asked to specify their religious affiliations, frequency of worship, worshipping style or the book they use for worship. In this survey, agnostics were classified as religious for their belief in the presence of a spiritual leader/being, even if they are unsure of whom or what it is.

2.3 Variables

The age, educational statuses and gender of respondents were recorded. Respondents were grouped into the following age ranges; 0-19, 20-39, 40-59 and 60+ years. The three variables for education were primary or less; secondary education and tertiary education. In the 0-19 age range, the age of the youngest respondent was 17 years old.

3. Results

3.1 Descriptive Statistics

Of the 107 respondents surveyed, 39% (n = 42) approved the indiscriminate use of embryonic stem cells (Table 2). A slightly higher number of respondents (n= 45; 42%) approved the use of stem cells under specific circumstances. These circumstances included the use of stem cells to cure terminal illness and the use of stem cells derived from IVF surplus embryos. Only 19% (n = 20) of the respondents were against the use of embryo-derived stem cells irrespective of the prevailing circumstances (Table 2).

Table 2: Attitudes of respondents towards stem cell research in Gaborone, Botswana

Opinion Choices	n
Approve the use of embryo-derived stem cells	42
Approve the use of embryo-derived stem cells under specific circumstances	45
Do not approve the use of embryo-derived stem cells under any circumstances	20
Total	107

Among the 42 respondents who approved stem cell research, 12% (n = 5) were not religious while the remaining 88% (n

= 37) stated that they were indeed religious (Table 3). Similarly, the minority (16%; *n* = 7) of respondents who approved the use of stem cells were not religious compared to the 84% (*n* = 38) who are religious. All 20 respondents who were against the use of stem cells were religious (Table 3).

Table 3: Attitudes of respondents towards stem cell research by religious status

Opinion Choices	Religious *(n)*	Non-religious *(n)*
Approve the use of embryo-derived stem cells	37	5
Approve under specific circumstances	38	7
Do not approve under any circumstances	20	0
Total	95	12

Almost three quarters (71%, *n*=76) of all respondents in this study were between the ages of 20 and 39 (Table 4). Among all the respondents, only 5% (*n* = 5) were 60 years old and above. There was a very uneven distribution of educational qualifications among the respondents. None of the respondents had a primary school qualification or less (no educational history at all). All respondents had either a secondary (junior and senior school) or university (certificate, diploma or degree) qualification. Only 16% *(n* = 17) of all the respondents had a secondary qualification while the majority had a tertiary qualification (84%; *n* = 90). The majority of respondents were female (60%; *n* = 64) with 40% (*n* = 43) being male (Table 4).

Table 4: Characteristics of respondents (*n* = 107)

	Approve *n* (%)	Approve under specific circumstances *n* (%)	Do not approve *n* (%)	Other *n* (%)
Age				
0-19 years	1 (2)	1 (2)	1 (5)	3 (3)
20-39 years	25 (60)	35 (78)	16 (80)	76 (71)
40-59 years	13(31)	8 (18)	2 (10)	23 (21)
60+ years	3 (7)	1 (2)	1 (5)	5 (5)
Education				
Primary School/less	0 (0)	0 (0)	0 (0)	0 (0)
Secondary School	9 (21)	7 (16)	1 (5)	17 (16)
Tertiary School	33 (79)	38 (84)	19 (95)	90 (84)
Gender				
Male	17 (40)	20 (44)	6 (30)	43 (40)
Female	25 (60)	25 (56)	14 (70)	64 (60)

4. Discussion

Most of the respondents in this study support stem cell research either indiscriminately or under specific circumstances. In fact, 81% (*n* = 87) of respondents approve stem cell use whether there are specific circumstances or not. Of this number, 86% (*n* = 75) of the respondents stated that they held religious beliefs. This was rather surprising considering the well reported objections to stem cell research in Africa due to religious, ethical and moral beliefs (Gaobotse, 2018; Ilkilic and Ertin, 2010; Jackson and Pepper, 2013; Nisbet, 2004). Research shows that developing countries around the globe and in Africa are faced with many challenges of providing sustainable and affordable health care against devastating communicable and chronic diseases (Boutayeb A and Boutayeb S, 2005; Jamison *et al*., 2006; World Health Organization, 2005). Stem cell research and therapy provide an opportunity to overcome this huge burden. Reported recent successes of stem cell therapy (Gupta *et al*., 2019; Hütter *et al*., 2009), against HIV, for example, may renew hope about the efficacy of this technology. Numerous studies have suggested that developing countries stand to gain the most from regenerative medicine and its composite branches such as stem cell research (Daar, 2005; Greenwood *et al*., 2006; Haseltine, 2003). It is estimated, for example, that 90% of people with blindness are from a poor background (World Health Organization, 2005). In addition, 60% of the causes of blindness are curable but in most cases cannot be cured because of the poor background of the sufferers. This is where stem cell therapy can play a pivotal role. In India, for example, adult stem cells have been successfully used to cure defective corneas (Sangwan *et al*., 2003).

People who approved stem cell research either indiscriminately or circumstantially mainly belonged to the 20-39 age range. This is the age range where people are more active in learning about new and trending fashion, gadgets and technologies. Stem cell research is no exception to this category. The overwhelming majority of respondents who agreed to stem cell research discriminately or indiscriminately were people with tertiary qualifications. Tertiary education engages learners in seeking information from different sources. This can expose them to information on new technologies such as stem cell research. This is more so true because Gaborone has the highest number of institutions of tertiary learning than any other town or city in Botswana (Education Statistics, 2011). Gaborone has also been reported to have the highest number of information sources such as radios and television sets than any other town or city in Botswana (Botswana AIDS Impact Survey III, 2008).Almost 60% (*n* = 64) of all respondents who took part in the study were female. Similarly, 60% (*n* = 25) of all the respondents who approved the use of embryonic stem cells indiscriminately were females. According to the Botswana Population and Housing Census of 2011, there are more women than men in Botswana. Therefore, women are more likely to be the majority number in gender-indiscriminate surveys such as this one.

This study showed that around 19% (*n*= 20) of all the respondents were against the use of embryonic stem cells irrespective of prevailing circumstances. There have been some occurrences in stem cell research which may contribute to some people losing faith or being unmotivated to support the research. In 2004, Hwang and colleagues published a paper (which has since been retracted) claiming to have derived stem cells form embryos that they had cloned themselves. This turned out to be false as they had faked their experiments, making them impossible to replicate in a laboratory setting. Falsified findings by some stem cell researches can cast doubt on the validity of stem cell research which can deter some people from trusting those involved in the research.

5. Conclusion

This study has highlighted that religious status in Botswana is not a determining factor in approval or disapproval of the use of stem cells. This was evidenced by the fact that the majority of the people who approved the use of stem cells were not religious. This study will provide guidance during the development of stem cell research and therapy programs in Botswana.

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