

Infertility Knowledge, Attitudes, and Beliefs of College Students in Grenada

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Abstract: The knowledge, attitudes and beliefs of college students in Grenada about infertility were assessed using a paper-based survey. The target population was students who attended the only college located on the island of Grenada. Five hundred and eight college students over the age of 16 out of the 1,946 students enrolled in the college at the time of the survey participated in this study with females comprising 65.7% ($n = 334$). The main research outcome measures for this study were to determine the level of knowledge of Grenadian college students on the causes of infertility as well as their knowledge of possible treatment options. Overall, while there was a moderate level of knowledge among both males and females with regards to the risk factors that may cause infertility, over 73% of the students believed that infertility may be caused by God's will and approximately 58% believed in the power of prayer to treat infertility. While a greater proportion of female students answered more questions correctly in comparison to their male counterparts, there was a notable lack of basic knowledge among all Grenadian college students about the causes of infertility with the overall perception that women are more likely to become infertile due to any number of causes that are of equal risk to both men and women. Further, this survey found that there are greater stigmas attached to male infertility than to female infertility. Education programs and community support groups are recommended to increase knowledge about the causes of infertility as well as decrease the stigma associated with this condition.

Keywords: Infertility, College Students, Grenada, Caribbean

1. Introduction

Infertility, defined as not being able to conceive after one year of unprotected sexual intercourse, is a global public health problem that affects more than 10% of the world's population (1). In the United States alone, almost seven million people are affected by infecundity. The prevalence of infertility is even higher in undeveloped countries with evidence suggesting that basic knowledge pertaining to the causes of infertility and potential treatment options lacking (1). Additionally, the beliefs and consequences of infertility significantly differ among countries; however, education is generally prioritized as the focal point of change (2-4).

Primary prevention of infertility is one of the most important factors for decreasing its incidence (5). Several studies have established that increasing age (6-10) and sexually transmitted infections (11-15) are important causes that can lead to a sharp increase in the incidence of infertility. Other research has identified the adverse impact of lifestyle factors such as smoking, diet, and exercise on fertility (5,

16-18). Although the above listed research has shown a significant association between these risk factors and infertility, the imparting of this information to especially young persons has not yet caught up with the education priorities of many low and/or middle-income countries.

In an infertility awareness study conducted on a group of American undergraduate students, the lack of knowledge ranged from grossly overestimating a woman's fertility window to the success rates of *in vitro* fertilization (19). Further, the majority of this American student population did not know basic general facts such as the percentage of involuntarily childless couples in the United States or the age at which fertility begins to decline. In another study among a similar population, there was limited knowledge about what were the preventable factors that could cause infertility (3). These results are consistent with other studies conducted in populations of predominately white, young adults of reproductive age in developed countries such as Sweden, Finland, Canada, Italy, and Israel (20-24).

Knowledge of the causes of infertility also appears to be lacking among adolescents and young adults living in several

developing countries. In one study conducted in a population of Iranian college students, it was found that these students had moderate to low levels of knowledge about reproductive health and family planning (25). Similar findings were found in a study conducted with Pakistani students (26). This study, as well as several others (2, 5), also found that many young persons believe in illusory causes of infertility (e.g., evil forces) and that cultural customs and rituals play a pivotal role in whether a couple can conceive.

Most infertility research in developing countries located in Africa, Asia, and Latin America has focused on geographical, regional, and socioeconomic status differences between these countries and other regions of the world (27-28). These studies do not include the Caribbean. In general, there have been very few published studies that assess the knowledge, attitudes, and beliefs of Caribbean adolescents and young adults with regards to infertility. In one study, it was shown that compared to American women, Caribbean women were less likely to share their infertility issues with their employers when requesting a leave of absence (29). In Barbados, chlamydia, genital warts, gonorrhea, and herpes are becoming increasingly prevalent among teenage girls, directly threatening their future fertility with a rise in pelvic inflammatory disease and ectopic pregnancies (30). Additionally, although a few Caribbean case reports have been written with respect to medical issues associated with infertility (31-32), we were not able to find any published studies that provided rates of infertility for the Caribbean.

This purpose of this paper is to present the results of a survey that was conducted to evaluate the knowledge, attitudes, and beliefs of the causes and treatment options for infertility among Caribbean college-aged (16-22 years) undergraduate students who live in Grenada, West Indies.

2. Materials and Methods

2.1. Participants

After securing ethics approval from the Institutional Review Board of St. George's University, Grenada, permission was sought and granted by the Director of Student Affairs at T.A. Marryshow Community College (TAMCC) to conduct this study. The TAMCC is the only college in Grenada and served as target population for this survey. The college is comprised of four schools: The School of Arts, Sciences, and Professional Studies; The School of Applied Arts and Technology; The School of Continuing Education; and an Agricultural Department. The first three schools are located on the main campus located in the parish of St. George with the Agricultural Department located on another campus in the parish of St. Andrew.

2.2. Survey Questionnaire Items

The survey questionnaire used in this study was developed using questions adapted from other studies (19, 32) as well as several questions developed specifically for this study population. The definition of infertility—the inability to

conceive a child after 12 months of unprotected sex—was given at the top of the questionnaire. The questionnaire was divided into four main sections. The first section captured demographic information. The second section provided a list of risk factors that could cause infertility, as well as potential treatment options. The third section contained multiple-choice questions regarding basic infertility knowledge with there being one correct choice among the four options given. The fourth section looked at the participant's beliefs about infertility with "Yes," "No," and "I don't know" answer choices. The second and third sections (excluding the two mythical factors) are the only two sections that had only one right answer from the available choices.

2.3. Data Collection Protocol

Students who were attending classes in any of the four schools during the two data collection timeframes (January 2013 Spring semester and June 2013 Summer semester) were conveniently sampled. The students filled out the single page questionnaire either during their class (if the lecturer allowed this) or during their free periods. Students were informed that all the information they provided was completely confidential and would not be used for grading purposes. Students were monitored to ensure that the surveys were completed quietly and without collaboration among classmates.

2.4. Data Analyses

Results were stratified by gender since previous studies have shown that there may be significant differences between males and females with regards to their knowledge about the causes of infertility and beliefs about this condition (3, 5). Descriptive data analyses were done using the online survey program SurveyMonkey (www.SurveyMonkey.com) and spreadsheet software program Excel (Microsoft.com).

3. Results

3.1. Demographics

A total of 508 surveys were received during the two collection periods. Total enrollment at the college at the time of the survey was 1,946 students. Most of the students were 18 years old (45.9%), female (61.4%), and had attended a public secondary school (89.8%) (Table 1). Of the surveyed students, 37.6% of the females students were sexually active with 8.4% reporting that they had at least one child whereas more than half (55.5%) of the surveyed male students were sexually active, with 8.6% reporting that they had at least one child (Table 2).

3.2. Infertility Knowledge: Basic Facts

Very few students believed that infertility is diagnosable as a disease (male students: 8.1%; female students: 3.9%) and less than 7% of all students knew that 70 million couples are involuntarily childless (male students: 5.7%; female students: 6.5%) (Table 2). Only 38.8% male and 44.7% female students

correctly knew that the most fertile time in a woman's menstrual cycle occurs in the middle of her menstrual cycle. Also, very few students knew that there is a marked decrease in a woman's fertility between the ages of 35 and 39 (male students: 6.3%; female students: 5.6%), with most students grossly overestimating the age range of decreased fertility. The majority of students, however, knew that both males and females could be responsible for infertility (male students: 84.9%; female students: 90.2%).

Table 1. College student demographics.

Parameter	N (%)
Total	508 (100)
Age (years)	
16	8 (1.6)
17	95 (18.7)
18	233 (45.9)
19	79 (15.6)
20	29 (5.7)
21	9 (1.8)
>21	11 (2.2)
Not specified	44 (8.7)
Gender	
Male	163 (32.0)
Female	312 (61.4)
Not specified	33 (6.5)
Type of Secondary School Attended	
Public	456 (89.8)
Private	22 (4.3)
Not specified	30 (5.9)
Type of Secondary School	
Co-ed	276 (54.3)
All girls	159 (31.3)
All boys	58 (11.4)
Not specified	15 (3.0)

3.3. Infertility Beliefs

The majority of participants believed that neither a man nor a woman should separate from their partner if they are unable successfully to conceive; however, there was an approximate 10% affirmative response increase among both male and female participants condoning separation when the cause of childlessness is due to the man (Table 2). The majority of male and female students believe in adoption, but more females than males think that medicine and surrogacy are acceptable forms of infertility treatment.

3.4. Knowledge of Infertility Risk Factors

3.4.1. Biological Risk Factors

The biological risk factors presented in the questionnaire are all positively associated with infertility (Table 3). More than half of male and female students knew that anatomical and hormonal issues such as an irregular menstrual cycle, genetics, abnormal sperm production and/or function, and a blocked fallopian tube could cause infertility. On the other hand, notable proportions of both female and male students did not think nor know that a genital tract infection (GTI) or sexually transmitted infection (STI) could cause infertility. In regards to male GTIs, more than 40% of the students did not think or did not know that male genital tract infections can

cause infertility (male students: 45%; female students: 42%). Similarly, in regards to female GTIs, about 40% of the students did not think or did not know that female STIs could cause infertility (male students: 40.1%; female students: 38.4%).

3.4.2. Lifestyle Risk Factors

Less than half of the students thought that smoking could cause infertility, but a majority of both male and female participants knew that drugs could affect fertility. Approximately similar proportions of males and females students knew that exposures to adverse environmental factors such as lead and radiation and previous contraceptive pill use by women could cause problems with conception. Over 40% of both male and female students either thought that past condom use could cause infertility or did not know that previous condom use is not a risk factor for infertility (male students: 41.9%, female students: 45%). Less than half of the students thought that alcohol consumption could cause infertility.

3.4.3. Mythical Risk Factors

The majority of male and female students believe that infertility is due to God's will. However, the students were equally divided on whether voodoo could have a role as a risk factor for infertility with a high percentage answering, "I don't know" (male students: 34.8%, female students: 25.5%).

3.4.4. Infertility Knowledge: Treatment

The majority of male and female students believe that infertility is due to God's will. However, the students were equally divided on whether voodoo could have a role as a risk factor for infertility with a high percentage answering, "I don't know" (male students: 34.8%, female students: 25.5%).

4. Discussion

This survey has revealed that there are notable gaps in the knowledge of Grenadian college students regarding the possible causes and treatment of infertility. More than three-quarters of both male and female participants were unaware that infertility is a significant issue worldwide.

One area of particular concern is that many Grenadian college age students erroneously associate past condom use as a possible risk factor for infertility. Given that condom use is one effective way to minimize STDs and GTIs, this mistaken view on the use of condoms by sexual active young adults can actually mitigate efforts to limit these known risk factors for infertility.

The data from this study showed that a high proportion of both male and female students thought that infertility risk factors (e.g., GTIs, STIs, genetics, smoking, drugs) affected females more so than males. This suggests that there is a perception among Grenadian students that women are more susceptible to infertility than men. Additionally, a greater percentage of both sexes condoned the separation of a couple if the man could not father a child which suggests that there may be a stigma attached to male infertility.

Bunting and Boivin showed that even in the first world nation of England, numerous notional beliefs regarding the causes of infertility persisted (5). The majority of Grenadian students in this study believed that infertility could be a result of God's will (male students: 68.4%, female students: 75.8%) and that infertility could be treated by prayer (male students: 51.3%, female students: 61.8%). These beliefs are probably due to the strong religious practices of Afro-Caribbean citizens (33).

Since voodoo is a religion that is practiced in West Africa and certain parts of the Caribbean, it was included as a risk factor due to the historical lineage of many Caribbean citizens of African descent (34). In this survey, 37.6% of those surveyed stated that they did believe that voodoo could cause infertility. It cannot be ruled out that some students may have stated that voodoo was a risk factor simply because it was provided as a possible risk factor.

The strong role of religion in Grenadian society may explain why belief in the power of faith in treating infertility may have had a very high percentage of affirmative responses compared to other non-faith based treatment options such as modern medical infertility treatment protocols. Future research is warranted to explore the role religion and perceived divine interventions have on Grenadian's view of medicine and medical treatments with regards to infertility outcomes.

Although most students showed that they knew what were the most common infertility treatments modalities—hormone injections, surgery, and artificial insemination—many (male students: 75.3%, female students: 68.8%) did not identify *in vitro* fertilization as another successful infertility treatment technique. It should be noted that this procedure is not currently available in Grenada, which may explain the lack of knowledge about this treatment modality for infertility.

Overall, among the students included in this study, female students knew more about infertility risk factors and treatment options than males. This could be due to the fact that females are more aware about infertility since they eventually bear children. It would be useful, however, to conduct further research using focus groups or interview sessions to extract the source of knowledge about infertility for males and females among this population.

There are several limitations to the generalizability of the results of this study. A convenient, non-random sampling strategy was used to get the sample for this study. Given, however, that there is only one college located in Grenada, it is reasonable to assume that the sample is representative of all Grenadian students who qualify for college level training. This sampling protocol would not, however, capture youths who would not qualify for college (presumably due to poor grades or their wish to pursue professions that do not require a college education) and hence these results cannot be used to provide an overall assessment of all youths in Grenada of their knowledge, attitudes, and beliefs towards infertility.

Finally, it is possible that due to the nature of the questions being asked in this study, some students who were unsure of

what a question was asking or did not know the answer but did not want to check "I don't know," or were fearful to ask the interviewer for clarification, may have guessed what they thought was the right answer rather than base their choice on actual knowledge and/or beliefs.

This survey study is the first of its kind to be conducted in Grenada. While it is encouraging to note that the majority of Grenadian students knew what are most of the biological and lifestyle risk factors for infertility are, these findings agree with previous studies that show there are still gaps in the knowledge of these youths as to the causes and treatments of infertility (3, 5, 19, 31, 32).

For example, in this study, it was found that there is still the widespread belief that women are more likely to become infertile due to any number of causes that are of equal risk to men and women. Further, there appears to be greater stigmas attached to male infertility. The identification of these misperceptions are important since if left unchecked they have the potential to perpetuate inequality between the sexes, which in turn can lead to serious social, physical, economic, and psychological consequences. Further, there is the possibility that these erroneous beliefs can translate into tangible adverse behaviors such as verbal abuse, physical violence, or shunning from the community due to the importance attached to being able to conceive a child. Additional research needs to be conducted among this population using more focused, personalized sessions to find out why the stigmas and inequalities identified in this study still.

It would also be very illuminating to conduct similar surveys among other Caribbean countries and compare the results. Future research can focus on inter- and intra-Caribbean student infertility knowledge, as well as obtaining each country's infertility rates. This would enable educators to appropriately tailor education programs to each Caribbean country's needs, as well as provide a general curriculum module that addresses the issue of infertility in a way that could work across the Caribbean.

This study is only the first step in identifying the exact needs for an infertility awareness education program in Grenada. It would be beneficial to have a teaching module inserted into secondary schools' health education curriculum that specifically addresses the topic of infertility. In order to support this proposed implementation to the curriculum, there will be the need to provide more quantitative statistical evidence that infertility is a significant public health issue in Grenada and that the majority of its citizens do not know much about it. Additionally, it would be beneficial to establish support groups throughout the island's parishes so that couples can see that there is a larger population of men and women who are experiencing the same issues. Concurrently, it would be useful to reach out to healthcare workers and religious leaders for their help in implementing infertility education programs. These recommendations would not only increase the knowledge and awareness of infertility in Grenada, but would also decrease the stigma attached to childlessness.

Table 2. Grenadian college students' sexual behavior, basic knowledge, and infertility beliefs.

Question	Responses	Male	Female
		Response	Response
	<i>n</i>	<i>n</i> (%)	<i>n</i> (%)
Behavior			
Male Sexual Behavior			
<i>Sexually active?</i>	155	86 (55.5)	
<i>Have at least one child?</i>	152	13 (8.6)	
Female Sexual Behavior			
<i>Sexually active?</i>	303		114 (37.6)
<i>Have at least one child?</i>	299		25 (8.4)
Infertility Knowledge			
	< 12 months	26 (16.6)	44 (14.5)
	12-24 months ^a	54 (34.4)	118 (38.8)
	25+ months	9 (5.7)	21 (6.9)
	I don't know	68 (43.3)	121 (39.8)
	Beginning	35 (21.9)	90 (29.6)
	Mid-cycle ^a	62 (38.8)	136 (44.7)
	End of cycle	20 (12.5)	41 (13.5)
	I don't know	43 (26.9)	37 (12.2)
	25-34	13 (8.1)	24 (7.9)
	35-39 ^a	10 (6.3)	17 (5.6)
<i>In what age range is there a marked decrease in a woman's ability to become pregnant?</i>	40-44	28 (17.5)	17 (5.4)
	45-60	93 (58.1)	188 (61.6)
	I don't know	16 (10.0)	22 (7.2)
	Male	3 (1.9)	3 (1.0)
<i>Who is responsible for infertility?</i>	Female	21 (13.2)	27 (8.8)
	Both ^a	135 (84.9)	277 (90.2)
<i>If a couple gets pregnant once, could they have a problem trying to get pregnant again?</i>	Yes ^a	68 (43.3)	154 (49.8)
	No	52 (33.1)	107 (34.6)
	I don't know	37 (23.6)	48 (15.5)
	Yes ^a	13 (8.1)	12 (3.9)
<i>Do you think infertility is a disease?</i>	No	117 (73.1)	257 (84.3)
	I don't know	30 (18.8)	36 (11.8)
	1 million	14 (8.8)	35 (11.4)
	10 million	20 (12.6)	50 (16.3)
<i>How many couples in the world cannot have a baby?</i>	50 million	16 (10.1)	16 (5.2)
	70 million ^a	9 (5.7)	20 (6.5)
	I don't know	100 (62.9)	185 (60.5)
Infertility Beliefs			
	Yes	25 (15.6)	17 (5.5)
<i>If a woman cannot have a baby, do you think her partner has a reason to separate from her?</i>	No	125 (78.1)	284 (92.2)
	I don't know	10 (6.3)	7 (2.3)
	Yes	40 (25.6)	44 (14.3)
<i>If a man cannot father a baby, do you think his partner has a reason to separate from him?</i>	No	99 (63.5)	252 (81.8)
	I don't know	17 (10.9)	12 (3.9)
	Yes	121 (77.1)	279 (90.3)
<i>If a couple cannot have a baby, do you think they should adopt?</i>	No	16 (10.2)	8 (2.6)
	I don't know	20 (12.7)	22 (7.1)
	Yes	80 (50.6)	178 (57.8)
<i>Do you think it is socially acceptable in your community to have a baby with the help of a doctor or medicine?</i>	No	50 (31.6)	72 (23.4)
	I don't know	28 (17.7)	58 (18.8)
	Yes	57 (36.3)	134 (43.2)
<i>Do you think it is socially acceptable in your community to have a baby with the help of a surrogate (someone who gives birth to a baby for you)?</i>	No	69 (43.9)	106 (34.2)
	I don't know	31 (19.7)	70 (22.6)

^a Correct answer

Table 3. Knowledge of Grenadian college students of infertility risk factors and treatment options.

	Male Response <i>n</i> (%)	Female Response <i>n</i> (%)	Response <i>n</i>
Biological Risk Factors			
Irregular Menstrual Cycle			
Yes	89 (58.6)	184 (61.3)	
No	36 (23.7)	67 (22.3)	
I don't know	27 (17.8)	49 (16.3)	
Total	152	300	452
Genital Tract Infection (Female)			
Yes	103 (65.5)	216 (70.4)	
No	21 (13.4)	46 (15)	
I don't know	33 (21)	45 (14.7)	
Total	157	307	464
Genital Tract Infection (Male)			
Yes	98 (62.4)	180 (62.3)	
No	29 (18.5)	41 (14.2)	
I don't know	30 (19.1)	68 (23.5)	
Total	157	289	446
Abnormal sperm production and/or function			
Yes	133 (83.1)	254 (85.8)	
No	18 (11.3)	17 (5.7)	
I don't know	9 (5.6)	25 (8.4)	
Total	160	296	456
Sexually Transmitted Infection (Female)			
Yes	94 (59.9)	189 (61.6)	
No	50 (31.8)	82 (26.7)	
I don't know	13 (8.3)	36 (11.7)	
Total	157	307	464
Sexually Transmitted Infection (Male)			
Yes	87 (55.1)	170 (58.0)	
No	57 (36.1)	77 (26.3)	
I don't know	14 (8.9)	46 (15.7)	
Total	158	293	451
Blocked fallopian tube			
Yes	130 (82.3)	245 (80.1)	
No	14 (8.9)	27 (8.8)	
I don't know	14 (8.9)	34 (11.1)	
Total	158	306	464
Genetics (Female)			
Yes	112 (72.3)	207 (68.8)	
No	24 (15.5)	42 (14.0)	
I don't know	19 (12.3)	52 (17.3)	
Total	155	301	456
Genetics (Male)			
Yes	112 (71.8)	181 (62.0)	
No	25 (16.0)	51 (17.5)	
I don't know	19 (12.2)	60 (20.5)	
Total	156	292	448
Lifestyle Risk Factors			
Smoking (Female)			
Yes	76 (48.4)	130 (42.6)	
No	49 (31.2)	114 (37.4)	
I don't know	32 (20.4)	61 (20.0)	
Total	157	305	462
Smoking (Male)			
Yes	74 (46.3)	110 (37.3)	
No	55 (34.4)	119 (40.3)	
I don't know	31 (19.4)	66 (22.4)	
Total	160	295	455
Drugs (Female)			
Yes	120 (75.0)	195 (64.4)	
No	18 (11.3)	56 (18.5)	
I don't know	22 (13.8)	52 (17.2)	
Total	160	303	463
Drugs (Male)			
Yes	113 (71.1)	167 (57.8)	
No	25 (15.7)	65 (22.5)	
I don't know	21 (13.2)	57 (19.7)	

	Male Response <i>n</i> (%)	Female Response <i>n</i> (%)	Response <i>n</i>
Total	159	289	448
Environmental factors (lead, radiation)			
Yes	101 (63.1)	167 (56.8)	
No	25 (15.6)	49 (16.7)	
I don't know	34 (21.3)	78 (26.5)	
Total	160	294	454
Previous contraceptive pill use (Female)			
Yes	120 (76.9)	224 (73.7)	
No	17 (10.9)	37 (12.2)	
I don't know	19 (12.2)	43 (14.1)	
Total	156	304	460
Previous condom use (Male)			
Yes	47 (30.3)	68 (23.2)	
No	90 (58.1)	161 (54.9)	
I don't know	18 (11.6)	64 (21.8)	
Total	155	293	448
Alcohol (Female)			
Yes	76 (48.4)	142 (46.9)	
No	55 (35.0)	94 (31.0)	
I don't know	26 (16.6)	67 (22.1)	
Total	157	303	460
Alcohol (Male)			
Yes	78 (49.1)	119 (41.3)	
No	58 (36.5)	95 (33.0)	
I don't know	23 (14.5)	74 (25.7)	
Total	159	288	447
Mythical Risk Factors			
God's will			
Yes	108 (68.4)	225 (75.8)	
No	21 (13.3)	39 (13.1)	
I don't know	29 (18.4)	33 (11.1)	
Total	158	297	455
Voodoo			
Yes	50 (31.6)	120 (40.8)	
No	53 (33.5)	99 (33.7)	
I don't know	55 (34.8)	75 (25.5)	
Total	158	294	452
Treatment Options			
Fertility drugs	99 (64.3)	197 (65.4)	
Surgery	76 (49.4)	114 (37.9)	
Hormone injections	79 (51.3)	192 (63.8)	
Traditional healer	23 (14.9)	42 (14.0)	
In vitro fertilization	38 (24.7)	94 (31.2)	
Artificial insemination	77 (50.0)	161 (53.5)	
Prayer	79 (51.3)	186 (61.8)	
Total	154	301	455

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