

ORIGINAL RESEARCH ARTICLE

Knowledge and attitude of adolescents towards sexual health and reproductive health technologies

DOI: 10.29063/ajrh2024/v28i8.6

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Abstract

Reproductive health and reproductive health technologies are one of the challenging health studies in the developing world. The study focuses on the knowledge and attitude of adolescent students towards reproductive health technologies. It is the need and responsibility of all individuals especially adolescents (the future procreators) to know about Assisted Reproductive Technologies (ART) and the sexual health related to it. The objectives are to evaluate the level of knowledge among late adolescents (18-21 years) regarding sexual and reproductive health. To understand the attitudes of late adolescents towards sexual health and reproductive health technologies. To identify gaps in knowledge and misconceptions about sexual and reproductive health among late adolescents. To determine the awareness and perceptions of late adolescents regarding various reproductive health technologies. The study was a mixed method, 46 respondents of age groups between 18-21 years (late adolescents) were selected, using simple random sampling. A self-administered questionnaire was circulated through Google Forms. Data was collected and analysed using SPSS Statistics Data Editor version 22. The level of knowledge the late adolescents have towards sexual health and reproductive technologies is very low and the study should explore all, to know the merits and demerits of Assisted Reproductive Technologies (ART) and the alternative methods for childbirth. The dissemination of information and availability of educational resources on sexual and reproductive health may be resulting in comparable levels of knowledge among individuals of various age cohorts. (*Afr J Reprod Health 2024; 28 [8]: 57-66*).

Keywords: Assisted reproductive technologies and reproductive health; IVF; PROST; TET; ZIFT

Résumé

La santé reproductive et les technologies de santé reproductive constituent l'une des études de santé les plus difficiles dans les pays en développement. L'étude se concentre sur les connaissances et l'attitude des étudiants adolescents à l'égard des technologies de santé reproductive. Il est de la nécessité et de la responsabilité de tous les individus, en particulier des adolescents (les futurs procréateurs), de connaître les technologies de procréation assistée (TAR) et la santé sexuelle qui y est associée. Les objectifs sont d'évaluer le niveau de connaissances des adolescents tardifs (18-21 ans) en matière de santé sexuelle et reproductive. Comprendre les attitudes des adolescents tardifs à l'égard des technologies de santé sexuelle et de santé reproductive. Identifier les lacunes dans les connaissances et les idées fausses sur la santé sexuelle et reproductive chez les adolescents tardifs. Déterminer la sensibilisation et les perceptions des adolescents tardifs concernant diverses technologies de santé reproductive. L'étude était une méthode mixte, 46 répondants de tranches d'âge comprises entre 18 et 21 ans (adolescents tardifs) ont été sélectionnés, par échantillonnage aléatoire simple. Un questionnaire auto-administré a été diffusé via Google Forms. Les données ont été collectées et analysées à l'aide de SPSS Statistics Data Editor version 22. Le niveau de connaissances des adolescents tardifs en matière de santé sexuelle et de technologies de reproduction est très faible et l'étude devrait tout explorer pour connaître les avantages et les inconvénients des technologies de procréation assistée (ART). et les méthodes alternatives d'accouchement. La diffusion d'informations et la disponibilité de ressources éducatives sur la santé sexuelle et reproductive peuvent aboutir à des niveaux de connaissances comparables entre les individus de différentes cohortes d'âge. (*Afr J Reprod Health 2024; 28 [8]: 57-66*).

Mots-clés: Technologies de procréation assistée et santé reproductive ; FIV ; PROST; TET ; ZIFT

Introduction

The World Health Assembly formulated the first global strategy to promote reproductive health targets in 2001. These reproductive health strategies

focused on five core reproductive and sexual health aspects. In that one of them is “providing high-quality services for family planning, including infertility services.” This meeting identified and recommended that infertility is a global health issue.

More advanced and innovative treatments should be distributed for the development of affordable cost Assisted Reproductive Technologies (ART) for low-resource settings²⁴. "According to CDC (Centers for Disease Control and Prevention), Assisted Reproductive Technologies includes all fertility treatments in which either eggs or embryos are handled. In general, ART procedures involve surgically removing eggs from a woman's ovaries, combining them with sperm in the laboratory, and returning them to the woman's body or donating them to another woman. They do not include treatments in which only sperm are handled (i.e., intrauterine, or artificial insemination) or procedures in which a woman takes medicine only to stimulate egg production without the intention of having eggs retrieved⁶. A basic human need is to have children. Every person has the option to grow properly and take care of their children. Stress caused by lack of a child has been linked to emotional symptoms such as anger, depression, anxiety, marital problems, and feelings of worthlessness. Additionally, partners may prove to be more difficult to conceive, mockingly developing sexual disease, social isolation, and many other intellectual problems¹⁴. According to WHO, "Infertility is a disease of the male or female reproductive system defined by the failure to achieve a pregnancy after 12 months or more of regular unprotected sexual intercourse"²⁶. Around the world, 186 million people and 48 million couples struggle with infertility²⁰. According to WHO, "A state of physical, emotional, mental, and social well-being in relation to sexuality; it is not merely the absence of disease, dysfunction, or infirmity. Sexual health requires a positive and respectful approach to sexuality and sexual relationships and the possibility of having pleasurable and safe sexual experiences, free of coercion, discrimination, and violence. For sexual health to be attained and maintained, the sexual rights of all persons must be respected, protected, and fulfilled"²⁷. The acquisition of abilities to regulate sexual arousal and manage the impact of sexual behaviour, as well as the emergence of novel forms of sexual intimacy, are traits of sexual development¹⁹. WHO states, "Reproductive health is a state of complete physical, mental, and social well-being and not merely the absence of disease or

infirmity, in all matters relating to the reproductive system and its functions and processes. Nearly 120 years ago in Philadelphia, a doctor used sperm donated by a medical student to inseminate a woman whose husband was sterile. This happened to be the first case of medical assistance in the typically private act of procreation. The public became furious when the successful case was published in a medical journal. There are many other Artificial Reproductive Technology (ART) procedures available today in addition to Artificial Insemination by Donor (AID), and it has been estimated that approximately 300,000 babies have been born globally as a result of Assisted Reproductive Technologies (ARTs). An example of this type of reluctant beginning in modern society is the emerging phase of the IVF procedure for heterosexual, infertile couples, which was met with initial resistance caused by the fear of the unknown and then relatively quick social adaptation¹⁷. The first birth by In Vitro Fertilization (IVF) was achieved in 1978. In 33 years, enormous aid was implemented to achieve pregnancies for couples who failed in a natural method. However, it is rare for new technology to be validated completely before being implemented in clinical settings, and improving scientific knowledge of the available techniques has done little change and understanding of how to use it⁴. Many studies express that adolescents are involved in premarital sex at an early age,¹¹ Postponement of parenthood is the main reason for extended pregnancy. This elaborates the understanding of including reproductive health information, sexual abuse counselling, reproduction and sexuality, maternal health, family planning services, sexually transmitted infections, gender issues medically, human immunodeficiency virus (HIV) and acquired immune deficiency syndrome (AIDS), severity of breast and cervical cancer.

According to the demographic and health survey in low-middle-income countries expressed that an impact on infertility issues that is one in every four couples is affected by infertility²¹. The systematic analysis of global, national, and regional trends elucidated that more than 190 countries and the places surrounding the regions identified that 48.5 million couples were infertile worldwide in 2010. This assisted reproductive technologies (ART) increases due to the availability of economic

support and availability of technological services with the involvement of government regulations in accessing positive reproductive health rights.

In India, Assisted Reproductive Technology (ART) has been developed to assist couples facing challenges in achieving parenthood due to infertility¹⁶. More than 500 babies are delivered in fertility centres per month in India, leading to advancements in the Assisted Reproductive Technology (ART) sector. The rising popularity of ART in India can be attributed to lifestyle changes, delayed marriages and parturientcy and a broader awareness of Assisted Reproductive Technology (ART). India has experienced the most substantial surge in ART centres across the country. Over the past decade, there has been a consistent increase in the number of ART treatments conducted in the country. The Indian Council of Medical Research (ICMR) recently conducted a survey that examined applications for the National ART Registry. According to this data, the estimation is there are 125 clinics in the capital city of India. Nevertheless, authorities estimate that the figure is more likely to be between 250 and 300¹³. Despite being born in Kolkata in 1978, Durga is considered India's first IVF baby, following in the footsteps of Louise Brown in the UK. However, due to the absence of documented proof, official recognition has been withheld. The first scientifically confirmed IVF birth in India took place in 1986, thanks to a government project led by the National Institute for Research in Reproduction (NIRR). However, this endeavour sprang from a wider concern about population management, as emphasised by the Indian Council of Medical Research (ICMR) in 1984.

The study on assisted reproductive technologies (ARTs) focuses on IVF (In Vitro-Fertilization), GIFT (Gamete Intrafallopian Transfer), ZIFT (Zygote Intrafallopian Transfer), TET (Tubal Embryo Transfer), and PROST (Pronuclear Stage Tubal Transfer)¹⁰. In vitro-fertilization (IVF) is “the process in which fertilization is done outside the body, the mature eggs are removed through a surgical procedure and are stored in a dish plate in the lab along with sperm for fertilization. After 3-5 days healthy embryos are

implanted in Women's uterus”⁷ The first successful live birth using the IVF procedure was in 1978³.

Tubal embryo transfer (TET) “This process is like GIFT (Gamete intrafallopian transfer) and ZIFT (Zygote intrafallopian transfer) the difference is the embryos which are transferred will be in an advanced stage compared to the other techniques, the embryos are transferred into the fallopian tubes two days after the fertilization, the embryo stage will be 2 or 4 cell stage”⁷. The first live birth was achieved using TET was in 1978²⁸. Pronuclear stage tubal transfer (PROST) is a “technique that involves in vitro fertilization (IVF) of oocytes, followed by the transfer of pronuclear oocytes into the fallopian tubes”²⁵. The first successful birth with the technique PROST was achieved in the year 1978⁵. GIFT (Gamete Intrafallopian Transfer) is the “process in which eggs are removed from the woman and placed in one of the fallopian tubes along with male sperm, where fertilization takes place inside the woman's body”¹. The first successful birth with the GIFT technique was in 1984⁹. ZIFT (Zygote Intrafallopian Transfer) “The process in which egg cells are removed from a woman's ovaries and In Vitro-Fertilized and the developed zygote is placed into the fallopian tube using laparoscopy and the embryo is transferred through laparoscopy 4cm inside the fimbria”. The first successful birth using the ZIFT procedure was in 1986. Through this ART over 8 million adults were conceived and the health status of both the mother and the child is highly controversial. Several studies have examined the knowledge among adolescents about the awareness of female infertility and related risk factors, Male infertility and its complications are less among them, and this may result in torpid care towards sexual health and safeguarding future fertility care.

Methods

The study was a mixed method, 46 respondents of age groups between 18-21 years (late adolescents) were selected, using simple random sampling. A self-administered questionnaire was circulated through Google Forms. Data was collected and analysed using SPSS Statistics Data Editor version 22.

Theoretical briefing

Technological determinism- Idea influenced by Karl Marx

This theory explains the way society and the economy changed from feudalism to capitalism, as capitalism emerged in stages¹². It explains the way social change and technological evolution are correlated. As parenthood is essential for humans, the natural process is also altered through technologies to make humans attain parenthood. As Karl Marx expressed technology has a positive description in connection with laws ART is one of them²³. Science and technology are self-governing; their advancement is riskier but unaltered by society. The relationship between technology, the driving force behind the change, society, and its target is viewed casually as going over social change. The premise of technological determinism stipulates that advancement in technology results in greater prosperity, wealth, and security. It has been noted that technology aids in resolving the problems of society and humanity¹⁵.

Social essentialism- Mannheim’s Unmask ideology

Medical technologies were perceived as empty panels that could be invaded and used by culture to gather useful information²³. According to social essentialism, technology is a saturated form of social interaction and serves as a sociological tool. Additionally, it creates interactions with social implications but does not change or advance on its own. In the dynamic relationship between technology and society, social interests influence how technologies are designed and used, which in turn influences how various social constituencies are activated. The social essentialist viewpoint is devoid of such a reciprocal dynamic². Unmasking refers to false consciousness, which emphasises the issue of a sociology of knowledge. Marxism provides the first conscious, reflective expression of a mode of consciousness that is older than that movement. Mannheim makes a distinction between exposing lies and exposing ideologies. It is also referred to as a phenomenon unique to modern medical technology.



Figure 1: Theoretical briefing

Technology in practice or exists-social constructivism Timothy Bartley

During the 1990s, medical sociologists largely adopted a more active approach to evaluate medical technologies from the interdisciplinary field of science and technology studies. Technology is one of many factors influencing the changing social and

technological structures. Since technology itself coordinates the clinical and organizational components of health care, it is not a blank slate to be interpreted, in contrast to the view of technology in social essentialism. Treatment, or any other action, in the health care industry, it is made possible by the location of these heterogeneous networks. Analysing the technology’s potential and

available options for treatment, recovery, or other goals is the primary goal. This kind of study focuses on the techniques that the different worlds offer and possess²³.

Objective of the study

Assess Knowledge Level: To evaluate the level of knowledge among late adolescents (18-21 years) regarding sexual and reproductive health.

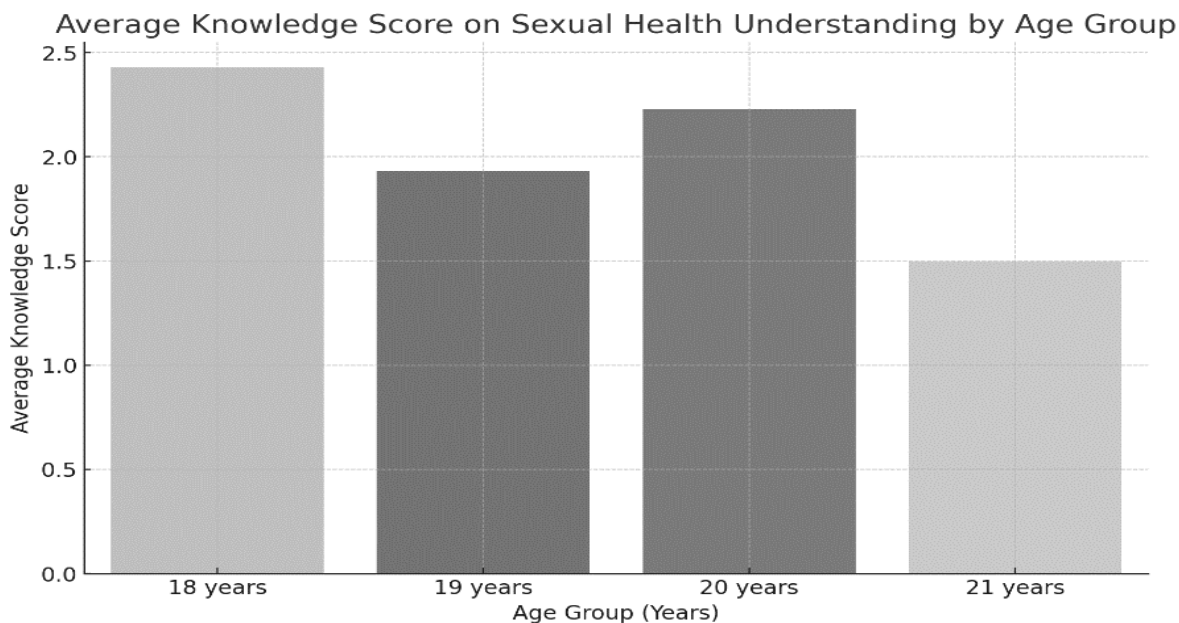
- Understand Attitudes: To understand the attitudes of late adolescents towards sexual health and reproductive health technologies.
 - Identify Information Gaps: To identify gaps in knowledge and misconceptions about sexual and reproductive health among late adolescents.
- Measure Awareness of Technologies: To determine the awareness and perceptions of late adolescents regarding various reproductive health technologies.

Results

From Table 1, the study compared average knowledge scores on sexual health understanding across four age groups (18, 19, 20, and 21 years old) using ANOVA analysis. The F-statistic score of 1.252 indicates a certain level of variance across the

groups, suggesting that although there are variations in the mean scores, they are not very significant. The P-Value score of 0.303 above the standard alpha level of 0.05 indicates a significant difference, suggesting that the observed disparities in average knowledge scores are likely a result of random variation rather than an actual discrepancy in knowledge levels among the age groups. The ANOVA results do not provide evidence for the "Knowledge versus Age Hypothesis," which posited substantial disparities in knowledge levels between late adolescents within the 18-21 age bracket. The study suggests that the observed disparities lack statistical significance.

Equivalent knowledge levels across age groups may have been achieved due to comparable exposure to and opportunity for learning about sexual and reproductive health. The age range of 18-21 years is relatively limited, and noticeable disparities in knowledge may be more apparent throughout a wider age spectrum, where developmental and educational phases differ more prominently. External influences such as education, cultural background, and information accessibility are expected to have a significant impact on the creation of knowledge.



Hypothesis 1: There is a significant difference in the level of knowledge about sexual and reproductive health between late adolescents within 18-21 age group

Table 1: Average knowledge score on sexual health understanding by age group

Age Group	Average Knowledge Score
18 years	2.43
19 years	1.93
20 years	2.23
21 years	1.50

Table 2: Sexual health understanding through age group

Source of Variation	Sum of Squares	Degrees of Freedom	F-Value	P-Value
Between Groups	1.25207	3	1.25207	0.303086

In the study, 23.9% of respondents expect that sexual health is about an attraction towards the opposite sex. 6.5% of late adolescents have very poor knowledge on sexual health. 34.7% of late adolescents believe that sexual health is “accessing the sex education and also healthy thoughts towards sexual drives”. 21.7% of late adolescents still feel that sexual health is a stigmatized topic in that 36.9% are girls and 19.5% are boys. 93.4% of respondents accepted that “sex and sexuality education is important for late adolescents.” 36.9% of girls responded “yes” and 19.5% of boys responded “yes”. The respondents also expressed that sexual health education is helpful in their lives through these factors:

- a) Explicit the taboos and misconceptions about sexual health.
- b) The proper information and knowledge practices help in a healthy sexual life in future.
- c) Genital cleanliness and prevention of sexually transmitted diseases and infections.
- d) Helps in understanding self-body development.
- e) Bring societal awareness through the impact of education.
- f) Self-realization.
- g) Aware of sexual violence.
- h) It is not gender-centered everyone should know about sex education.
- i) Increase humanity and break stereotypes.
- j) Prevent unintended pregnancies and reproductive health discrepancies.

In conclusion, the analysis indicates that age does not have a substantial impact on knowledge levels pertaining to sexual health understanding in the group being studied. This discovery underscores the

importance of considering additional variables that could impact knowledge levels in adolescents.

Hypothesis 2 Table 3: According to the Levene’s Test for Equal Variances from the above table indicates that there is a substantial variation in variances ($p < 0.05$), which implies that the assumption of equal variances may not be valid. t-test for the equality of means assuming equal variances: Since the p-value ($p = 0.056$) exceeds the conventional significance criterion of 0.05. It is failed to reject the null hypothesis. It is accepted the Null hypothesis at 5%. According to this test, there is limited evidence indicating a potential disparity in the average frequency of conversations among late adolescents. However, this difference does not reach statistical significance at the standard level of significance. t-test for comparing means when the assumption of equal variances is not made: In this test that accounts for unequal variances, the p-value ($p = 0.086$) remains higher than 0.05. Like the preceding test, it indicates some indication of a disparity in averages, but it lacks statistical significance. Overall, both t-tests indicate a potential inclination towards a disparity in the frequency of conversations regarding sexual health subjects among male and female adolescents. However, this disparity does not reach statistical significance at the selected level of significance.

80.4% of respondents expressed that they discuss health-related topics and discussion with their friends and peer groups, in that 52.1% were girls and 28.2% were boys. Respondents expressed the involvement of their parents when they discuss about sexuality-related topics 39.1% of parents feel that their parents explain the proper information, 32.6% of parents will not respond or avoid the content 19.5% of parents “feel embarrassed”, and 8.69% of parents feel angry and irritated. So, this indicates that late adolescents are willing to clarify their doubts related to sexual health but most of the parents are still stuck with their non-progressive mindset that influences their wards to seek information elsewhere.

Hypothesis 3: According to the above table, the correlation coefficient of 0.316 indicates an especially fine affiliation among instructional heritage and mind-set in the direction of reproductive health technologies. Since, the p-Value of 0.033 is less than the significance degree of 0.05, indicating that the connection is statistically

Table 3: Levene’s test and t-test

Hypothesis 2: There is no significant between the male and female related to sexual health-related topics and discussions with their friends or peer groups.

Independent Samples Test:

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
sexualhealth relatedtopic swithyourfriendsorpeergroups	Equal variances assumed	15.963	.000	1.967	44	.056	.3782	.1923	-.0094	.7657
	Equal variances not assumed			1.784	25.462	.086	.3782	.2120	-.0581	.8144

Hypothesis 3: There is no significant between the adolescents with higher levels of education have more positive attitudes towards reproductive health technologies

Correlations:

		Educational qualification	Attitude
Educational qualification	Pearson Correlation	1	.316*
	Sig. (2-tailed)		.033
	N	46	46
Attitude	Pearson Correlation	.316*	1
	Sig. (2-tailed)	.033	
	N	46	46

Correlation is significant at the 0.05 level (2-tailed).

Hypothesis 4: There are no significant differences between the attitudes and knowledge about sexual and reproductive health between male and female adolescents.

Pearson Correlation Correlations:

		Attitude	Sex
Attitude	Pearson Correlation	1	-.113
	Sig. (2-tailed)		.455
	N	46	46
Sex	Pearson Correlation	-.113	1
	Sig. (2-tailed)	.455	
	N	46	46

tremendous at the 0.05 level (two-tailed). Reject the null speculation with an importance degree of 5%.

The correlation helps the adolescents with better ranges of schooling have extra advantageous attitudes closer to reproductive fitness technology, and the education correlation indicates that

youngsters with higher tiers of education have more satisfying views toward the reproductive fitness era. The remarkable correlation coefficient suggests that as academic attainment will increase, there may be a tendency for attitudes in the direction of reproductive fitness era to emerge as more beneficial. 41.3% of respondents are aware of surrogate and gestational carriers. 69.5% of respondents know about in-vitro fertilization (IVF), 39.1% of respondents are aware of the assisted reproductive technique Zygote Intrafallopian Transfer (ZIFT), 21.75% of respondents are aware of the Tubal Embryo Transfer technique. 19.5% of respondents know about Gamete Intrafallopian Tube Transfer (GIFT), and 32.6% of respondents know about Pronuclear Stage Tubal Transfer (PROST). 65.2% of respondents state that the concept of contraceptive measures strikes that it is a birth control method.

Adolescents who have acquired greater schooling are more likely to have positive attitudes

approximately reproductive health technologies. The findings display a strong and statistically sizable correlation between late adolescent's attitudes towards reproductive fitness technologies and their degree of training. This finding validates the evidence that improved degrees of training are linked to extra outstanding perspectives within this precise scenario.

Hypothesis 4: Pearson's correlation coefficient changed to calculate to degree of the strength and path of the connection between mindset and gender. The correlation coefficient among those variables is approximately -0.113. The p-value related to this correlation coefficient is 0.455 (significance degree > zero.05).

The correlation coefficient of about -0.113 shows a very vulnerable terrible correlation between mindset (toward reproductive health technology) and gender (sex). However, the correlation is extremely near zero. The poor sign of the correlation coefficient suggests a moderate tendency for men to have slightly much less remarkable attitudes closer to reproductive health technologies compared to women, however, the correlation is so vulnerable that it is not almost significant. The p-value of 0.455 is more than the importance level of 0.05, indicating that the correlation is not always statistically huge on the zero.05 degree (2-tailed). The null speculation is rejected at the 5% stage. 78.2% of respondents support and expect sexual health intervention programmes which address the queries related to healthy sexual life, in this 45.6% of respondents are female and 32.6% of respondents are male. 73.9% of respondents believed that proper sexual health education would prevent the late adolescent from getting abused. In this 43.4 % of female respondents agree the statement and 30.4% of respondents are male. So, from this response it is understood that late adolescents expect valuable courses and sexual education that substantiate all the sexual health-related queries.

Discussion

Attitudes on ART among developing countries have a polarized approach on the supportive and non-supportive factors that brings a constructive approach. This is to inspect the new innovative ways and possibilities to make ART available to fulfil the needs of the developing world²⁴.

Understanding the male and female reproductive systems, including sexual function, puberty, pregnancy, and menopause, is crucial for establishing good relationships, navigating developmental phases, and maintaining reproductive health and fertility²⁰. Infertility presents a substantial obstacle for numerous Indian couples, affecting all facets of their lives as they endeavour to establish a family. Nevertheless, infertility in India holds significant importance because of the nation's extensive historical background, complex cultural fabric, and deeply ingrained religious convictions. In this context, women often bear a greater burden than males due to cultural expectations when a couple experiences infertility. In some areas, a woman's worth is conventionally linked to her capacity to conceive and give birth. Regrettably, this societal pressure results in substantial social and cultural repercussions for women who are facing infertility. Research consistently indicates that women experiencing infertility tend to have a diminished quality of life, namely in terms of their mental health, social interactions, and emotional state. Moreover, women encounter a higher degree of social disapproval in comparison to men⁸. Current trends suggest that demand for ART will go up, particularly among older mothers, notwithstanding ongoing inequities by race and social status. These predictions show the impact of unequal access and outcomes on ART births, emphasising the importance of addressing these gaps through policies²². ART has transformed infertility treatment, resulting in the birth of over 5 million children who would not have been born otherwise¹⁸.

Conclusion

The outcome of the study indicated the level of knowledge the late adolescents have towards sexual health and reproductive technologies is very poor. The attitude towards ART late adolescents is mostly familiar with IVF (In-Vitro Fertilization) but they lack knowledge of other reproductive technologies. This study helped them to get familiar with other reproductive technologies and other healthy practices for sexual well-being. The mindset of the adolescents related to ART, men have better awareness compared to women correlation coefficient is 0.455. The study applying t-tests suggests that there may be a trend indicating that

male and female adolescents have distinct conversation frequencies when it comes to sexual health subjects. The P-value of 0.303, exceeding the frequently employed significance level of 0.05, implies that the observed disparity in average knowledge scores might be attributed to random variation rather than an actual discrepancy in knowledge levels between the age groups.

Limitations and Scope of the study

The study was limited to late adolescent's of age category 18-21 years. The study also posits that late adolescents need more programmes on sexual health and well-being, the merits and demerits of reproductive technologies, and access to information with proper sexual health hubs and centres. Recommend to develop modules that help late adolescents to access information related to reproductive technologies and sexual health. Awareness programmes of reproductive technologies among colleges. Further studies could focus on the before and after effects of reproductive technologies and the implications on sexual health

Conflicts of interest

No conflict of interest was reported from the authors.

Funding

No funds were received for this study.

Data availability statement

The data collected for statistical explanation are available in the given reference and the other data were collected through quantitative methods available. Due to the confidential and sensitive reasons available with the authors upon request.

Acknowledgement

The authors thank Dr. Bhavana.S for helping with the data analysis and the anonymous reviewers for the useful comments on the article.

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