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Prevalence of Gonorrhea and Associated Knowledge, Attitudes, and Practices Among High School Students in Burao City, Somaliland

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Abstract

Background: *Gonorrhea, caused by the bacterium Neisseria gonorrheae, is a prevalent sexually transmitted infection (STI) that significantly impacts the health and well-being of individuals worldwide. It is the second most common preventable and treatable STI. In women, gonococcal infections often do not exhibit noticeable symptoms, leading to undetected and untreated infections. This can result in severe complications such as pelvic inflammatory disease, ectopic pregnancy, and infertility. Hence, the objective of this research was to evaluate the prevalence of gonorrhea infection among high school students in Burao city, Somaliland, while also examining their knowledge, attitudes, and practices associated with this infection.*

Methods: *A quantitative method was employed to conduct an institutional-based cross-sectional study in selected schools in Burao city. The sampling method used was systematically random. To collect the data, a structured questionnaire with four parts was utilized. The collected data underwent a thorough process of checking for completeness, cleaning, coding, and entry using Kobo toolbox software (ODK). Subsequently, the data were exported to the Statistical Package for Social Sciences (SPSS) version 27 for analysis. Descriptive statistics were utilized to describe the study population to relevant variables. Furthermore, the chi-square test and odds ratio were performed at a 95% confidence interval using a p value of less than 0.05.*

Results: *The study included 384 participants, with almost equal sex distributions. The response rate was high at 99%. The majority of participants had a negative attitude toward gonorrhea, while a significant proportion had accepted practices. The prevalence of gonorrhea was 2.1%. Logistic regression analysis revealed that good knowledge and a positive attitude toward gonorrhea were associated with higher levels of acceptable sexual practices. Additionally, practices and attitudes toward gonorrhea were strongly associated with each other.*

Conclusion: *According to this study, the level of awareness regarding gonorrhea infection among schoolchildren in Burao city was significantly inadequate. Even though more than half of the students reported no sexual relationships, a considerable number of them were still engaging in risky sexual behaviors such as unprotected sex.*

Keywords: Gonorrhea, Practices, Sexually Transmitted Infection, Gonococcal Infection, Somaliland

Background

Neisseria gonorrheae is the bacterium responsible for causing gonorrhea, a sexually transmitted infection (STI) that is both preventable and treatable. It is the second most common STI worldwide and can cause urethritis in men and mucopurulent cervicitis in women. In men, untreated urethral infection can cause epididymitis, urethral stricture, and infertility. Infants born to mothers with gonococcal infection can develop new-born conjunctivitis, which can result in blindness if left untreated [1].

Gonorrhea leads to substantial infections in the mucous membranes of the genital tracts of both males and females, resulting in cervicitis, urethritis, and vaginitis. Additionally, some of the causative agents can also infect the mouth, throat, eyes, and rectum [2]. Among the four prevalent treatable sexually transmitted infections (chlamydia, gonorrhea, trichomoniasis, and syphilis), gonorrhea has emerged as the second most fatal infection worldwide, primarily due to the increase in multidrug-resistant N. gonorrheae [3]. In 2016, the World Health Organization (WHO) documented approximately 86.9 million newly reported cases of infection among individuals aged 15 to 49 years [4].

The transmission of the disease primarily occurs through sexual contact with an infected partner's penis, vagina, mouth, or anus. Nonetheless, it can also be transmitted from a mother to her child during pregnancy or childbirth. Moreover, this disease has significant immediate and long-term effects and is a risk factor for acquiring and transmitting HIV [5].

According to the findings of the Somaliland demographic health surveys, a greater proportion of women sought treatment for STIs or STI symptoms in the private sector than in the public sector. A staggering 78% of these women did not receive any form of guidance or treatment, primarily due to limited healthcare accessibility and the social stigma surrounding STIs [6].

The issue of STIs in Burao, Somaliland, is comparable to that of other developing nations. Despite this, there have been no prior investigations on the knowledge, attitudes, and practices (KAP) of STIs in different areas of the country. Furthermore, there has been no research conducted on the current KAP status of gonorrhea infection among high school students in Burao, Somaliland. As a result, it is crucial to gather information, raise awareness, and expand our understanding of gonorrhea epidemiology to combat this global threat. In particular, educating the next generation of students is of utmost importance since young people have a significant impact on the future development of their country. Therefore, the objective of this study was to evaluate the prevalence and associated knowledge, attitudes, and practices regarding gonorrhea infection among high school students in the city of Burao, Somaliland.

Study Area and Setting

An institutional-based cross-sectional study using a quantitative method was conducted to assess the prevalence of gonorrhea and associated knowledge, attitudes, risky behaviors, and preventive practices among high school students in Burao city, Somaliland. Somaliland is located on the southern coast of the Gulf of Aden. It has hundreds of miles of coastline along the Gulf of Aden to the north, it borders Ethiopia to the south and west, and Djibouti to the northwest of the country is one of the cities in Somaliland and the second capital city of Somaliland. The source population was all Grade 11 and 12 students in the selected schools in Burao city according to the use of a systematic random sampling technique.

Sample Size Determination

Size determination was performed by using a single population proportion formula with the following assumptions on the prevalence of Neisseria gonorrheae, which was 35% in Mekele town, Ethiopia, with a 95% confidence interval (CI), 5% marginal error, and 10% contingency for the nonresponse rate [7].

where:
n = needed sample size
Z= standard normal distribution value at 95% confidence interval =1.96 P = population proportion (35%)
d = desired absolute precision (5%)
where n = the needed sample size.
Zα/2 = 1.96 for a 95% confidence interval
P= population proportion (35%)
d = margin of error between the sample and population (5%) = 0.5

$$\mathbf{n} = \frac{(Z\alpha/2)^2 * P(1-P)}{d^2}$$

$$n = \frac{1.96^2 * (0.35) * (0.65)}{0.0025} = 349$$

After adding 10% of the nonrespondents, the final sample size was 384.

Study Population and Sampling Techniques

All 11 and 12 grade students in the selected schools in Burao city were selected by using a systematic random sampling technique from a total of 1190 students from different high schools in Burao city (candlelight=350, SH Bashir=250, Sh Ibrahin= 290, Wadajir= 300) in the primary study units (schools), and a simple random sampling method was employed to reach the secondary study units (students). The number of participants from Candlelight, Sheik Bashir, Dayaxa, Sheik Ibrahin, and Wadajir was determined using proportional allocation to size, and the same procedure was applied to select the number of participants for the respective levels. Study participants were subsequently selected from each selected school.

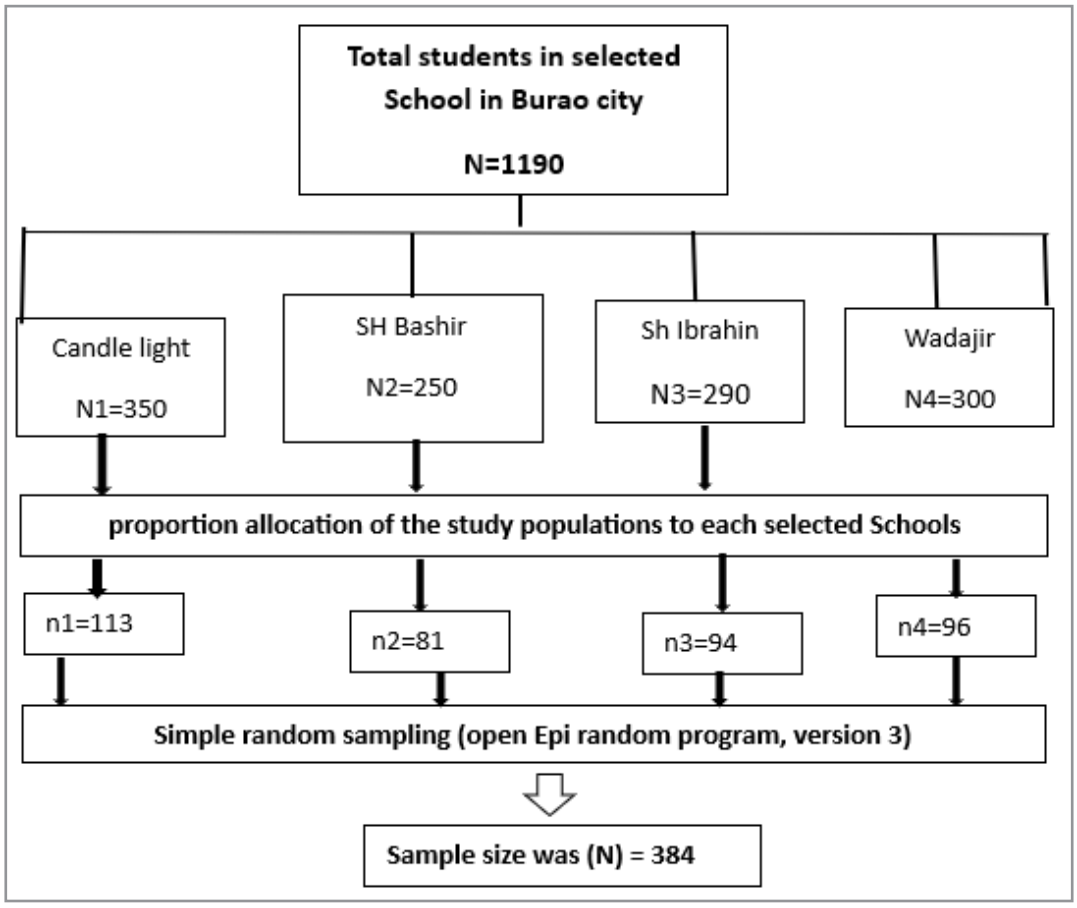

Figure 1: sampling techniques

Data Collection

The data collection instrument used in this study was adapted from different studies depending on the local situation and the study objectives. The structured questionnaire, which consists of four parts, was used to assess the prevalence of gonorrhea and associated knowledge, attitudes, risky behaviors, and preventive practices among high school students in Burao city. The respondents were then considered based on their knowledge, attitudes, and practices related to gonorrhea. Then, the data were obtained using a structured questionnaire that was translated into both Af-Somali (the local language) and English by language experts to maintain conceptual consistency.

During this study, the data were collected by 2 nurseries and 3 midwiferies, and 1 supervisor supervising the data were collected who could speak the Somali language. The principal investigator regularly supervised the data collection. The data collectors were trained for two days, including the pretest, and training included roleplay, how to handle the data, how to maintain confidentiality, and how to approach the participants.

Before data collection, two days of training were given to both the data collectors and supervisors by the principal investigator. Before the interviews, the data collectors informed the clients about the aims/purposes, risks, and possible benefits of the study and about the right and refusal to participate in the study. The collected information was kept confidential. Study participants who were willing to participate and signed the voluntary consent form were interviewed. The data were collected through face-to-face interviews using a structured and pretested questionnaire.

Data Quality Control

The quality of the data was ensured through the training of 5 data collectors and 1 supervisor on the objective of the study. After providing the training, a pretest was administered to 5% of the sample in Burao city-selected schools to check the clarity of the questionnaire before the actual data collection began. Adjustments and corrections to the questionnaires were made based on the findings of the pretest. The data were collected by trained data collectors and supervisors. The principal investigator checked the data daily for completeness.

Data Analysis

The quantitative data were checked for completeness, cleaned, coded, entered into Kobo toolbox software (ODK), and exported to the Statistical Package for Social Sciences (SPSS) version 27 for analysis. Descriptive statistics were employed to describe the study population to relevant variables. The chi-square test and odds ratio were performed at the 95% CI using a p value of <0.05.

Ethical Clearance

The study was conducted after obtaining ethical clearance from Shifa University, the Institutional Health Research Ethics Review Committee (IHRERC), and the College of Health Sciences, and a permission letter was written to the relevant authorities.

Informed, voluntary, written, and signed consent was obtained from both the heads of the schools and the study participants. The importance of participation and the purpose of the study were discussed, and code numbers were used throughout the study to keep the information confidential.

Results

Sociodemographic characteristics of the respondents

The study included a total of 384 participants, 49.7% of whom were male and 50.3% were female. The response rate for the study was 99%. The average age of the participants was 18.32 years, with a standard deviation of 1.910. The age range of the participants was 14 to 28 years, with a minimum age of 14 and a maximum age of 28. Of the total participants, 39.3% were Grade 11 students, while the remaining 60.7% were Grade 12 students. Additionally, 61.5% of the participants had a private occupation (Table 1).

Table 1: Sociodemographic characteristics of the study population

Variables	Number	%
Sex		
Male	191	49.7
Female	193	50.3
Grade		
Grade 11	151	39.3
Grade 12	233	60.7
Occupation		
Government	21	5.5
Private	236	61.5
Merchant	95	24.7
Driver	32	8.3
Age		
Mean±SD=18.32±1.910		
Range=14		

Knowledge and Attitudes About Gonorrhea and STIs

Of the 384 individuals surveyed, approximately 92.2% of the participants demonstrated a good understanding of the transmission routes, signs, and symptoms of gonorrhea infection, with 83.6% knowing this area. The majority of the study participants, accounting for 380 students (99%), were aware that condoms serve as a means of protection against gonorrhea during sexual intercourse. Additionally, 76% (292 students) and 85.7% (329 students) were knowledgeable about the treatability and curability of gonorrhea, respectively. A significant portion of the students, 201 (52.3%), recognized that gonorrhea disproportionately affects young people compared to other segments of society. Interestingly, 327 students (85.2%) felt comfortable discussing gonorrhea, while 56 students (14.6%) did not. Furthermore, the majority of participants, 352 students (91.7%), agreed that educating students about gonorrhea infection is an important practice within schools. Consequently, a significant majority (341 respondents; 88.8%) believe that the school has been adequately informed to mitigate the risk of gonorrhea. Additionally, 351 respondents (91.4%) emphasized the importance of sexual education at the high school level. In terms of overall knowledge of gonorrhea, 46.09% of the participants had poor knowledge, while 53.91% had good knowledge (Table 2) (Figure 2).

Table 2: Students' knowledge about gonorrhea infection

Question	1. Yes%	2. No%
1. Knowledge about gonorrhea and its route of transmission (via sex and mother to child)?	354 (92.2)	30(7.8)
2. Knowledge of signs and symptoms of gonorrhea?	321 (83.6)	62 (16.1)
3. All burning sensations could be the symptoms of gonorrhea.	308 (80.5)	74 (19.3)
4. Condom is important to avoid gonorrhea during sexual intercourse?	380 (99)	4 (1)
5. Knowledge about the treatment of gonorrhea?	292 (76)	92 (24)
6. Gonorrhea is a curable disease.	329 (85.7)	54 (14.1)
7. Gonorrhea mainly affects younger people.	201 (52.3)	183 (47.7)
8. Do I feel comfortable enough to discuss gonorrhea?	327 (85.2)	56 (14.6)
9. Advising students about gonorrhea is good?	352 (91.7)	32 (8.3)

10. I am sufficiently informed to avoid the risk of gonorrhea.	341 (88.8)	43 (11.2)
11. Sexual education obtained at school is important?	351 (91.4)	33 (8.6)
12. Discussing STIs with parents can safeguard them from STIs	119 (31)	265 (69)
13. Alcohol consumption is a predisposing factor for STIs	1 (0.3)	383 (99.7)
14. Peers can influence sexual activity?	130 (33.90)	254 (66.1)
15. Sex education and gonorrhea prevention could improve the quality of life?	191 (49.7)	193 (50.3)
16. Sexual intercourse before marriage is a means of acquiring STIs.	187 (48.7)	197 (51.3)

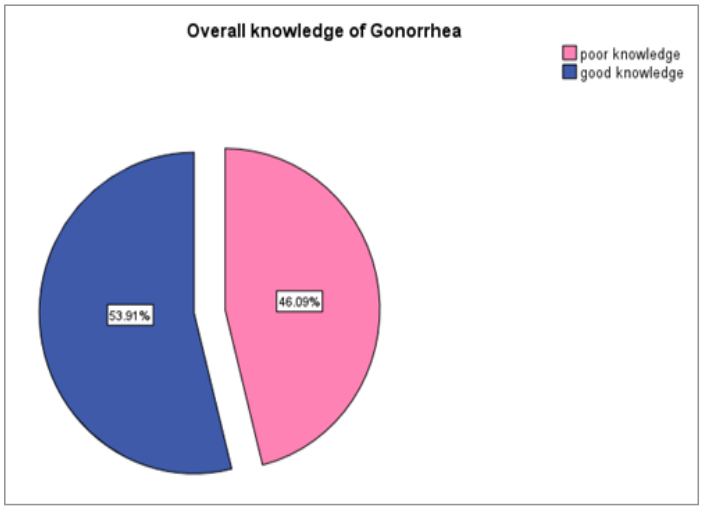

Figure 2: Overall knowledge of gonorrhea

Attitudes Toward Gonorrhea and Infected People

The majority of the students, 82.6% (317 participants), displayed a positive attitude toward family members infected with gonorrhea. Additionally, 84.4% (324 participants) were willing to study with students who had gonorrhea. Despite this positive outlook, a significant portion (approximately 82%) of participants continued to maintain friendships with classmates who were infected with gonorrhea. Similarly, nearly 80.7% expressed a willingness to engage in discussions about gonorrhea with their peers. A large majority, 82.3% (316 students), felt comfortable if the school principal or director provided information about the impacts of gonorrhea. Furthermore, 56.5% (217 students) believed that biology teachers should take responsibility for educating about gonorrhea infection. Most of the students, 76.8% (295 participants), had no issue purchasing items from shopkeepers who were infected with gonorrhea. However, while 57.8% (222 respondents) acknowledged that gonorrhea is a community problem, 43.5% of the students did not consider it their personal concern. Interestingly, 59.4% (228 students) did not view gonorrhea as a form of divine punishment but rather as a consequence of unsafe sexual practices among individuals. Overall, 51.56% of the participants were assigned a negative attitude, and 48.44% were assigned a positive attitude (Table 3) (Figure 3).

Table 3: Students' attitudes about gonorrhea infection

Question	1. Yes%	2. No%
1. Can you be willing to take care of a family member if they become sick by gonorrhea?	317 (82.6)	67 (17.4)
2. If a student is infected by gonorrhea, could he/she be permitted to continue studying in the school?	324 (84.4)	60 (15.7)
3. Can you still continue to be a friend with gonorrhea infected classmates?	315 (82)	69 (18)
4. Are you willing to discuss gonorrhea with your classmates?	310 (80.7)	74 (19.3)
5. Are you comfortable if the school principal briefs about the impacts of gonorrhea?	316 (82.3)	68 (17.7)
6. Only biology teachers have a responsibility to teach about gonorrhea infection?	217 (56.5)	167 (43.5)
7. If a person in a shopping area is gonorrhea infected, would you be willing to buy items from him/her	295 (76.8)	89 (23.2)
8. Is safe sex is difficult to practice?	133 (34.6)	248 (65.4)
9. Gonorrhea is not the problem of the community?	162 (42.2)	222 (57.8)
10. Gonorrhea does not concern you?	167 (43.5)	214 (55.7)
11. Gonorrhea infection is God's punishment	156 (40.6)	228 (59.4)

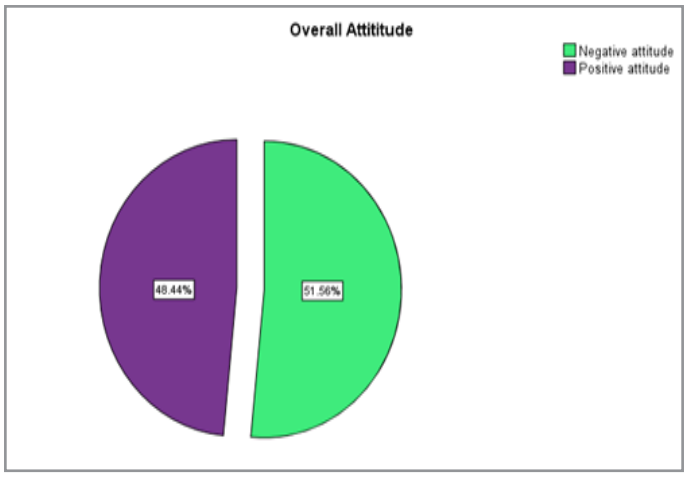

Figure 3: Overall attitude toward gonorrhea

Students' Practices and Prevalence of Gonorrhea

During the time of the interview, the majority of respondents (85.7%) reported not engaging in sexual intercourse. Of the participants, only 2% reported carrying condoms in their pocket, indicating a lack of precautionary measures. Among the 14.3% of respondents who had sexual experience, 3.9% reported having sex under the influence of alcohol. Additionally, 2.6% of the students reported having more than one sexual partner, which is concerning given the misuse of condoms. Preventive practices for gonorrhea were unacceptable in 33.85% of the patients, while 66.15% of the patients were deemed acceptable. The overall prevalence of gonorrhea among students who were checked for the disease and whose diagnosis was based on recorded syndromes was 2.1% (Table 4) (Figure 4).

Table 4: Students' practice of gonorrhea infection

Question	1. Yes%	2. No%
1. Ever had sex before?	55(14.3)	329(85.7)
2. Do you keep condoms in your pocket?	8(2)	376(98)
3. Do you have sex under the influence of alcohol?	15(3.9)	368(95.8)
4. Do you use condom during sex?	224(6.2)	360(93.8)
5. Do you have more than one sexual partner?	10(2.6)	374(97.4)
6. Have you taken gonorrhea test after sexual intercourse?	8(2.1)	376(97.9)
7. Do you have gonorrhea history related to sexual intercourse in the past 12 months?	12(2.1)	372(96.9)
8. Do you stop when a condom is teared during sex?	96(25)	288(75)

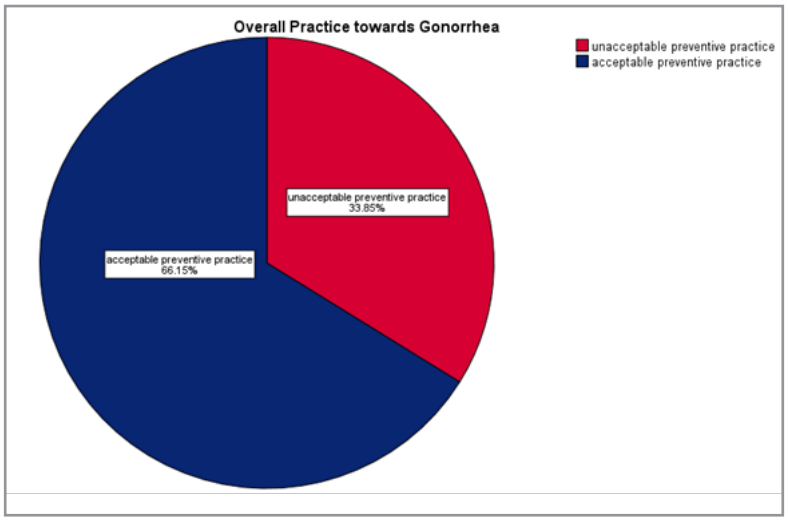

Figure 4: The overall practice of gonorrhea

Prevalence of gonorrhea among students

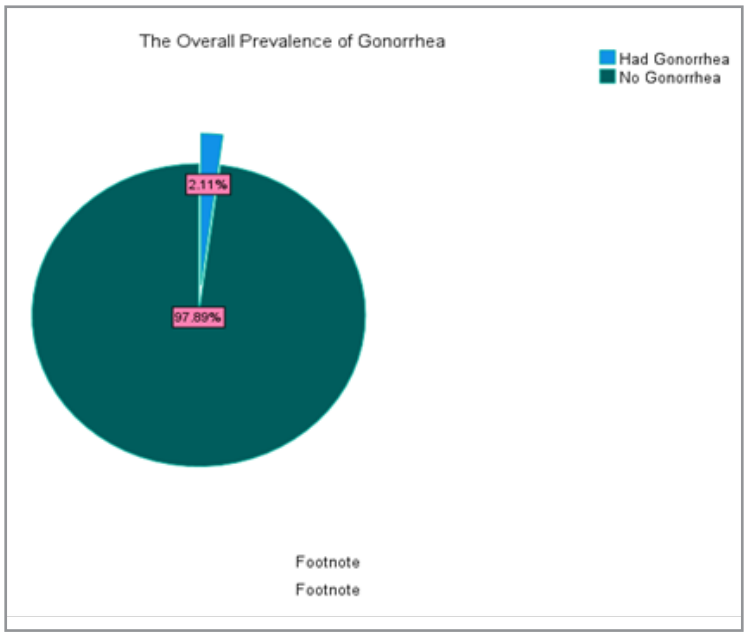

Figure 5: Prevalence of gonorrhea among students who had a history of sexual experiences in the last 12 months (n=384)

Relationships among knowledge, attitudes and practices

The risky behavior and preventive practices of students toward gonorrhea infection were found to be significantly influenced by both their knowledge and attitude. The chi-square test revealed a statistically significant association between students' attitudes toward gonorrhea and risky preventive practices ($\chi 2$ (1, n = 384) = 20.473, p = 0.001). Similarly, there was also a significant association between students' knowledge of gonorrhea and risky preventive practices ($\chi 2$ (1, n = 384) = 2.937, p = 0.019). Therefore, the knowledge level of participants plays a crucial role in shaping their risky behavior and preventive practices toward gonorrhea and STIs. Logistic regression analysis further demonstrated that students with a higher level of knowledge exhibited a greater percentage of acceptable sexual practices than did those with poor knowledge (50.8% vs 49.2%; AOR = 2.972 (1.8-4.679)). Additionally, students with negative attitudes were found to have 20.473 times greater odds of engaging in unacceptable sexual behavior than students with positive attitudes (AOR = 20.473, 95% CI 0.586 (0.374-0.918)).

Table 5: Logistic regression analysis of knowledge and attitudes toward practices

Variables		Practice		Total	$\chi 2$	p value	AOR (95% CI)
		unacceptable preventive practice	acceptable preventive practice				
Overall attitude	Negative attitude	88(67.7%)	110(43.3%)	198	20.473	<0.001	0.586(0.374-0.918)
	Negative attitude	42(32.3%)	144(56.7%)	186			

Variables		Practice		Total	$\chi 2$	p value	AOR (95% CI)
		unacceptable preventive practice	acceptable preventive practice				
Overall, Knowledge	Poor Knowledge	52(40%)	125(49.2%)	177	2.937	0.019	2.972(1.8-4.679)
	Good Knowledge	78(60%)	129(50.8%)	207			

Discussion

At one of Burao City's first high schools, we conducted a survey among students to assess their awareness of gonorrhea infection. Our findings revealed that the respondents possessed a commendable level of knowledge about the disease. Specifically, they had a good grasp of the symptoms, indications, and mode of transmission of gonorrhea infection. Moreover, they were well informed about the available treatments and prognosis of the disease. These results indicate that gonorrhea infection is better understood than other curable STIs, despite being one of the four most common ones [8]. Despite the fact that most students are cognizant of the high prevalence of infections among young and sexually active individuals in society, there are certain gaps in knowledge that hinder students from engaging in open conversations about STIs or gonorrhea infections with their parents. This observation could reflect the influence of the students' upbringing and cultural background.

In Somali culture, discussing any matters related to sexuality or the associated health concerns in the presence of children is considered highly disrespectful, particularly within traditional families. However, in modern times, students have greater opportunities to learn and comprehend sexually transmitted infections through their parents. This is because they cultivate a culture of openness among their peers and in society from an early age. Moreover, only a small fraction of individuals at the school level possess knowledge on how to protect themselves against the risk of gonorrhea. The majority of participants were also unaware of the factors that contribute to sexually transmitted infections, such as alcohol consumption and peer pressure to engage in sexual activities. Despite being aware of gonorrhea and other sexually transmitted infections, 99.7% of the respondents were found to be ignorant of the hazards associated with premarital sex. Adolescence is a critical phase in an individual's development, as it presents opportunities to explore new experiences, including engaging in sexual relationships [9].

Another study revealed that students held negative perceptions toward individuals who were afflicted with STIs. Hence, it is even more crucial to address these misconceptions through comprehensive sexual education programs and promote a culture of understanding and empathy among young people. By doing so, we can foster a more inclusive and supportive environment that encourages open dialog and reduces the stigma associated with STIs [10]. Inadequate knowledge regarding the mode of transmission and spread of gonorrhea among African adolescents and university students might be a potential cause of this difference [11]. Despite the fact that biology teachers and school principals were believed by numerous students to be responsible for educating the public about gonorrhea infection and orientation, some students still lacked knowledge about the issue and left it to the community. While the students' perceptions seemed valid, it is important to sensitize them through school anti-STI organizations and youth mini-media to alter their negative attitudes toward the disease, which has a greater impact on adolescents and young people in the community [12].

The results of our investigation suggest that a considerable proportion of the participants had engaged in sexual activities in the past. This implies that they might have engaged in at least one hazardous behavior that could have put them at risk of contracting gonorrhea and other sexually transmitted infections. This discovery is comparable to the outcome of research conducted in the Eastern Cape area of South Africa 10. A study conducted in Gondar, Ethiopia, reported a marginally greater incidence than did the aforementioned research [13].

Even though more than 50% of the participants in the survey were not currently involved in sexual relationships, their comprehension of casual sex was found to be inadequate. Given that casual sex is prevalent among young adults, it was observed that most of the respondents did not carry condoms with them for protection. Additionally, the study revealed that a significant number of participants engaged in sexual activity without using condoms while under the influence of alcohol. This outcome was consistent with global findings. Furthermore, various authors have noted that students who are less sexually active are less likely to continue engaging in sexual activity if a condom tears during sexual contact. These findings are virtually identical to those previously reported [10].

The findings indicate that the participants had a restricted understanding of the consequences of gonorrhea and other sexually transmitted infections (STIs). The most successful measures for preventing gonorrhea and other STIs are fidelity and abstinence, however. Additionally, our investigation revealed that 2.1% of the sample group had gonorrhea, which was significantly lower than that reported by Gondar (20.8%) [14]. The prevalence of gonococcal infection in Gambella was 11.3% according to a study conducted by Ali et al. in 2016. This rate is approximately similar to the reported rate of gonococcal infection in Hawassa, which was 5.1%, as reported by the hospital, Adama, Malawi (4.5%), Ghana (2.65%), and Somaliland (2%) [6, 15-18]. The current study revealed a significantly greater incidence of gonorrhea than the average incidence in Africa and worldwide, which were 1.75% and 0.8%, respectively [8].

The absence of a relationship between sociodemographic factors and hazardous behaviors and STI prevention practices of students was revealed by chi-square analysis. This finding may be attributed to the presence of comparable environmental and cultural factors that influence the issue. Furthermore, the results of binary logistic regression indicated that there were no significant associations between preventative practices and the sociodemographic characteristics of the respondents, with a p value greater than 0.05. It is worth noting that this outcome differs from the findings of the LaoS study [19]. In addition, students who had a lower level of comprehension exhibited a greater degree of acceptable sexual conduct (AOR=2.972, 95% CI 1.8-4.679, p 0.019). Furthermore, there was a significant association between appropriate sexual behavior and students' positive attitudes (AOR=0.586, 95% CI=0.374-0.918, p=0.001). These findings align with the results of a prior investigation [10].

The limitations of the survey were evident, as it failed to encompass all school-aged students in the country who were not enrolled in higher or preparatory institutions. Moreover, the determination of gonorrhea incidence solely relied on self-admin-

istered questionnaires completed by the students, lacking any clinical confirmation. To obtain a comprehensive understanding of gonorrhea and accurately assess its incidence rate across the entire nation, a comprehensive study incorporating diagnostic procedures must be conducted, encompassing all high schools and uneducated young individuals.

Conclusion and Recommendation

Conclusion

A study conducted in Burao city, Somaliland, revealed that the overall knowledge of gonorrhea infection among children in school was moderately low, with a percentage of 46.09%. Surprisingly, more than half of the students reported having no sexual relationships. However, a significant number of them were still engaging in risky sexual behaviors such as unprotected sex, having multiple partners, and engaging in sexual activities while under the influence of alcohol or influenced by peers. Compared to the global average, the study group had a greater percentage of self-reported gonorrhea cases. Additionally, it was found that the students displayed a positive attitude toward individuals and classmates who were infected with gonorrhea, which can be attributed to their awareness and knowledge about the disease.

Recommendation

To reduce the occurrence of gonorrhea and other sexually transmitted infections (STIs) among high school students, enhancing students' understanding, mindset, and behavior regarding sexual health through education and preventive measures aimed at controlling the spread of infections through sexual intercourse is highly recommended.

Conflict of Interest

No conflicts of interest

Acknowledgments

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Availability of Data and Materials

All the data generated or analyzed during the current study are available from the corresponding author upon reasonable request.

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Consent for Publication

Not applicable

Competing Interest

The authors have no competing interests.

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