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Pregnancy Preferences in Females of Reproductive Age with Sickle Cell Disease at Laquintinie Hospital: A Cross-Sectional Analysis

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Abstract

Introduction: Females with sickle cell disease (SCD), despite having a delayed pubertal development, are subject to many worries relating to their abilities to conceive, their capacity to maintain a maternofetal-risk-free pregnancy till term and give birth to healthy children without sickle cell disease. Knowing that unplanned pregnancies are more likely to increase maternofetal morbidity and mortality, we sought out to explore the pregnancy preferences in female patients with sickle cell disease to promote healthy conception and childbirth in this vulnerable population. **Methodology:** We conducted a cross-sectional study involving female patients of child-bearing age with sickle cell disease followed at Laquintinie Hospital Douala or who were members of a local sickle cell association. Pregnancy preferences were determined using the Desire to Avoid Pregnancy (DAP) scale. Factors associated with pregnancy preferences were determined using multivariable linear regression model. Threshold for significance was set at $p < 0.05$. **Results:** Seventy-seven patients were included with a mean age of 24.71 ± 5.53 years. Forty patients (51.95%) had one sexual partner and thirteen women (32.5%) used contraceptive methods. Most patients (46.0%) responded "Strongly Agree" or

"Agree" to the statement "it would be a good thing for me if I became pregnant in the next 3 months". The mean DAP score was 1.63 ± 0.91 [1.28 ± 0.82 in those who had a sexual partner and 1.99 ± 0.86 in those who had no sexual partner]. Factors that were positively associated with DAP score were students (b = 0.32, 95% CI [0.21, 0.95], p = 0.003), monthly income ≥ 100,000 FCFA (b = 0.24, 95% CI [0.07, 0.81], p = 0.022), and not having a sexual partner (b = 0.26, 95% CI [0.11, 0.85], p = 0.012). **Conclusion:** Most female patients with SCD have a low desire to avoid pregnancy. This is especially true for patients who are not students, have a partner and have a low monthly income.

Keywords

Pregnancy Preferences, Sickle Cell Disease, Laquintinie Hospital, Cameroun

1. Introduction

Sickle cell disease is a hereditary disease linked to a qualitative abnormality of hemoglobin making individuals affected more prone to hemolysis and vaso-occlusive phenomena. It affects approximately 30 million people worldwide and involves 300,000 births each year [1] [2]. It affects approximately 0.49, 0.07, 0.68, and 10.68 per thousand live births in America, Europe, Asia, an Africa respectively [3]. Reports suggest that 25% - 30% of Cameroonians are carriers of the sickle cell trait in its heterozygous form, while 2% - 3% of them possess the homozygous form [4].

Sickle cell disease represents a public health problem because it is linked to high morbidity and mortality [5]. Before the 1970s, very few children with sickle cell disease survived beyond the age of 10 years [6]. With the implementation of neonatal screening, prevention and treatment of acute complications, particularly infections, survival has improved over the years [7]. Life expectancy increased from 14 years in 1973 to 50 years in 2003 [8]. As a result, questions relating to reproduction have taken on an increasingly important role in the care of female patients with sickle cell disease [9].

Reproduction is an important aspect of a woman's life, and this is especially true for African women [10] [11]. According to the WHO an adequate female reproductive life implies that a woman has a satisfactory sex life and has the capacity and the freedom to have children or not. Puberty brings about all morphological modifications necessary for the acquisition of the reproductive function [12]. In women with sickle cell disease, pubertal development is delayed. Menarche has been reported to be retarded by up to 2.4 years in female patients with sickle cell disease [13] [14] [15] [16] [17]. Females with sickle cell disease are subject to many worries, doubts and questions relating to their abilities to conceive, their capacity to maintain a maternofetal-risk-free pregnancy till term and give birth to healthy children without sickle cell disease. Though pregnancy

in patients with sickle cell disease is associated with a risk of mortality [18], there is a wide variation in maternal mortality ranging from 0.07% in the United States [19] to more than 9.2% in Nigeria [20] and many pregnancies have reported a favorable outcome [21]. Pregnancies that are unplanned are more likely to result in low birth weight, preterm births, disease transmission and maternofetal deaths [22]. There is currently a lack of prior research on specific aspects of pregnancy preferences (e.g., desired timing) in SCD population globally and validated tools like the Desire to Avoid Pregnancy (DAP), seldom used in resource-limited settings, constitute promising tools to evaluate these preferences. We therefore sought to explore the pregnancy preferences in female patients with sickle cell disease at Laquintinie, Cameroon.

2. Methodology

Study Design and study setting: This was a cross-sectional study carried out at Laquintinie Hospital Douala (LHD). LHD is a second-category reference hospital built in 1931 in Douala, the economic capital of Cameroon. More specifically, the study was conducted at the integrated sickle cell treatment center, also known as the Emmanuel Bilong Centre (EBC), which operates under the paediatrics department. It is the sole centre in Cameroon exclusively devoted to the care of patients with sickle cell disease. Around 350 patients are seen monthly for routine, acute and chronic complications. Patients were also recruited from a local sickle cell association named Warriors against Sickle Cell Disease (WAS). This association is located in Douala and has more than 150 active members with sickle cell disease.

Study period: The study was carried out over a period of 8 months from November 2022 to June 2023.

Population selection: Eligible patients were all female patients with sickle cell disease of child-bearing age consulted at LHD or belonging to the WAS association. In this particular context, convenient and snow-ball sampling techniques were implemented due to the expected social stigma linked to sickle cell disease and engaging in conversations with researchers about pregnancy preferences, both of which have the potential to induce psychological distress and reduce research uptake. We included only patients aged 15 - 45 years. Patients or caregivers of patients between 15 - 17 years who did not provide informed consent to participate in the study were excluded.

Outcome of interest: The main outcome of interest was the mean Desire to Avoid Pregnancy (DAP) score. We compared the mean DAP score in female patients with sickle cell disease who had a main sexual partner and those who had no sexual partner.

Sample size calculation: Goleen *et al.* in the US in 2019 [23] reported that female patients with no sexual partner have a mean DAP score of 2.54 ± 0.93 in patients while those with a sexual partner had a mean DAP score of 1.86 ± 1.03. Based on these results, for a desired confidence interval of 95%, a power of 80%,

the ratio of exposed samples to those not exposed to 1, a significance threshold of 5%, the minimum sample size is 33 patients in each exposure group, giving a total of 66 patients [24].

Data collection tools and procedures: Patients meeting the eligibility criteria were identified in the outpatient clinic of the EBC and at the WAS association. Eligible patients received an information leaflet. The women who agreed to participate in the study could provide their informed consent immediately or at any other convenient time for them. For those wishing to defer their consent, their telephone numbers were registered, and we contacted them at a time convenient for them to enquire about their consent status. After obtaining consent, a questionnaire was administered to the patients to gather sociodemographic and clinical information such as the profession, educational level, partner status, frequency of vaso-occlusive crises and transfusions and a brief gynaecological and obstetrical history including use of contraceptives, age at menarche, menstrual characteristics, and previous pregnancies.

The Desire to Avoid Pregnancy (DAP) scale: The DAP scale has been reported to be a valid and reliable measure of women's desire to avoid pregnancy and is highly predictive of pregnancy within the next 12 months with eighty per cent of women with the lowest DAP score reported to get pregnant within 12 months, compared with < 1% of those with the highest DAP score [25] [26]. The DAP (Desire to Avoid Pregnancy) score was developed and evaluated in the United States in 2019 by Rocca *et al.*, validated by various studies including that of Jessica Gipson *et al.* in the United States of America in 2021 [27] which assessed the desire to avoid pregnancy and the use of contraceptives among women treated with methadone in Los Angeles (α = 0.92) and that of Jennifer Hall *et al* in 2022 [26] which evaluated the desire to avoid pregnancy score in the United Kingdom (α = 0.96). It is a psychometrically validated measure assessing women's preferences regarding pregnancy and childbearing prospectively, comprising three domains: 1) cognitive preferences, 2) affective feelings and attitudes towards pregnancy, 3) the anticipated practical consequences in the event of pregnancy. It consists of 14 items, each of which uses a five-point Likert scale rated from 0 - 4 asking women to what extent they agree or disagree with a statement concerning becoming pregnant in the next 3 months or have a baby in the coming year. For negatively worded items, 4 corresponds to "strongly agree"; for positively worded items, 4 corresponds to "strongly disagree".

The average of the responses is calculated giving a total score varying between 0 - 4. Higher scores reflect a greater desire to avoid pregnancy. The DAP score is intended to be used as a continuous measure and rounding scores is not recommended. The particularities of this score are diverse: it is the only score evaluating women's preferences for pregnancy prospectively. It does not only allow the expression of a positive or negative feeling but also ambiguity and uncertainty, it was designed for prospective use, in other words to identify women who wish to have or not have a pregnancy in the near future. No studies using the DAP score were found in Africa.

The total DAP score in our study had a Cronbach's Alpha is 0.92 which denotes excellent reliability, indicating that the items measure the underlying construct very consistently.

Statistical analysis: Data was entered and analysed using the SPSS version 23 software. Quantitative variables were presented as mean and standard deviations, while qualitative variables were presented as frequencies (counts) and percentages. Mean values were compared between patients with a sexual partner and those without a sexual partner using the independent Student t-test. Multivariable linear regression analysis was then performed using clinically relevant variables like contraceptive use, socioeconomic status, nulliparity etc. that were statistically significant on univariate analysis to identify independent factors associated with DAP score. Statistical significance was set at $p < 0.05$ and the strength of the association was expressed as odds ratio with the 95% Confidence Interval (CI).

To assess the reliability of our score we used the Cronbach α coefficient. For the interpretation of Cronbach's alpha, values > 0.9 reflected excellent reliability; >0.8 reflected good reliability, >0.7 reflected acceptable reliability, >0.6 reflected questionable reliability, >0.5 reflected weak reliability, < 0.5 reflected reliability that was not acceptable.

Ethical considerations: Ethical clearance was obtained from the Institutional Ethics Committee for Research on Human Health of the University of Douala No 3578 CEI-UDo/03/2023/T. Eligible patients were clearly informed of the purpose of the study and their consent was obtained prior to inclusion in the study. Our study was carried out in strict compliance with the fundamental principles of medical research.

Operational definitions

- Childbearing age: this is the period during which the woman is physiologically fertile; according to the WHO it is between 15 and 45 years old [23].
- Quantity of menstrual flow: This is the volume of blood lost during periods. It was estimated indirectly using the number of sanitary pads/tampons used per day. It was considered normal if < 5 tampons/pads were used per day
- Sexual partner: Person with whom the patient has a romantic relationship and is considered as most serious to her.

3. Results

3.1. Patient Recruitment

Of the 136 eligible participants, 43.38% (n = 59) were excluded for various reasons which included refusal to participate (n = 25), unreachable on phone (n = 21), absent contact information (n = 5), and living out of Douala (n = 8).

3.2. Sociodemographic Characteristics of Patients

Ages ranged from 15 - 41 years with a mean age of 24.71 ± 5.53 years. The most represented age group were the patients aged 20 - 29 years old (n = 48, 62.3%).

Most patients were students (n = 36, 46.8%), single (n = 70, 90.9%), had attained tertiary level education (n = 38, 49.3%) and had a monthly income below 100,000 FCFA (n = 53, 68.9%).

3.3. Clinical Characteristics of Sickle Cell Disease

In the 12 months prior to inclusion, most patients reported less than 10 vaso-occlusive crises (n = 51, 66.2%), one to two hospitalisations (n = 51, 66.2%) and to have no transfusion (n = 49, n = 63.6%). Most used routine medication was folic acid (n = 66, 85.7%). Three in 10 patients had abnormal body mass index: 19.7% (n = 13) underweight and 7.58% overweight (n = 5).

3.4. Menstrual Characteristics and Sexual Life

Mean age of menarche was 15.18 ± 2.56 years with a range of 11 - 24 years. Late menarche was reported in 20.8% of patients (n = 16). Mean age of first sexual intercourse was 20.15 ± 2.57 years and most patients had their first sexual intercourse after 18 years (n = 41, 77.36%). Most patients (n = 71, 92.2%) had a normal menstrual cycle length. The mean cycle duration was 28.6 ± 4.56 days. Both duration (2-7 days) and quantity of menstrual flow (<5 pads/tampons per day) was considered normal in all our patients. The number of cumulative sexual partners varied between 1 and 7 with an average of 3.02 partners since first sexual intercourse. A total of 51.95% (n = 40) of patients had one sexual partner: 42.86% (n = 33) lived separately from their partner and 9.09% (n = 7) lived with their partner. Thirteen women (32.5%) used contraceptive methods: condoms (n = 11, 27.5%), oral contraceptive pills (n = 1, 2.5%) and injectable contraceptives (n = 1, 2.5%). Of those with partners, only 40% (n = 16) knew the haemoglobin electrophoresis status of their partners and this was HbAA (n = 15) in most.

3.5. Desire to Avoid Pregnancy (DAP)

Most patients (46.0%) responded "Strongly Agree" and "Agree" to Item1 statement "it would be a good thing for me if I became pregnant in the next 3 months" which represents evaluation of cognitive desires and preferences. Similarly, most patients (40.5%) responded agreed to Item 10 statement "Thinking about having a baby within the next year makes me smile" which represents affective feelings and attitudes. For the evaluation of anticipated practical consequences, most patients (25.7%) responded "strongly disagree" to the Item 13 statement "If I had a baby in the next year, it would be hard for me to manage raising the child" as shown in **Figure 1**.

Though the Cronbach's alpha coefficient for the overall DAP scale in our sample was 0.81, the Items 5 and 11 had unacceptable reliable scores as shown in **Figure 2**.

The mean DAP score was 1.63 ± 0.91 with ranges from 0.14 to 3.29. Patients who had a sexual partner had a mean DAP score of 1.28 ± 0.82 while patients who had no sexual partner had a mean DAP score of 1.99 ± 0.86. The only variable

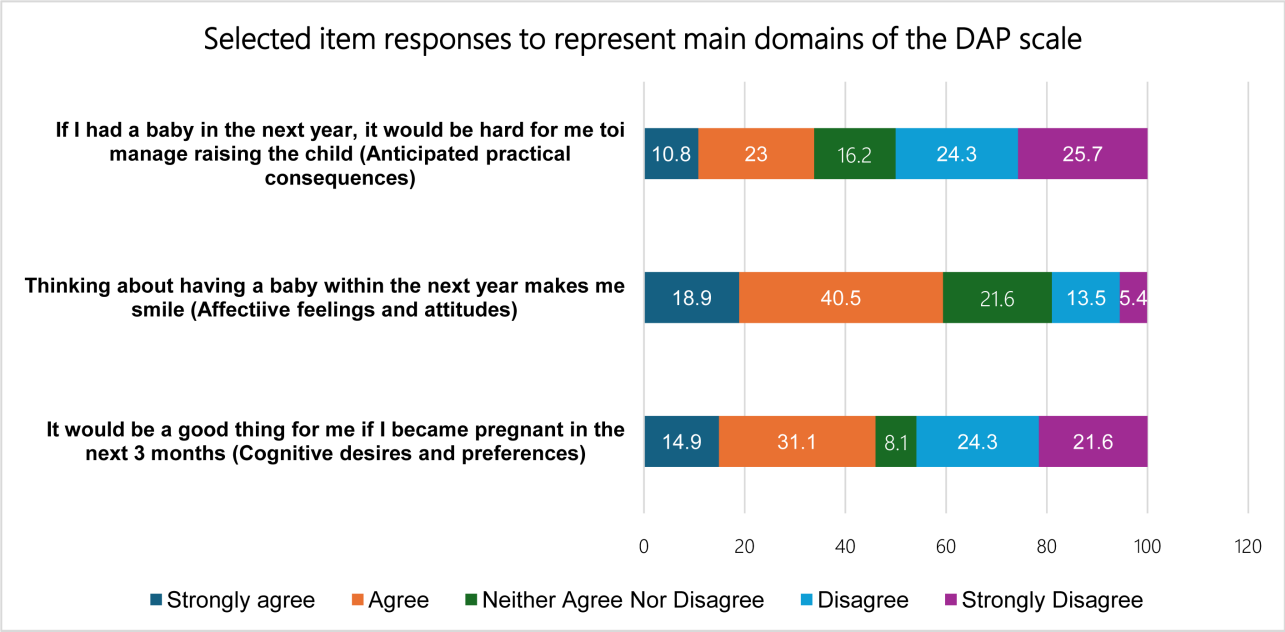

Figure 1. Selected item responses to represent domains of the DAP scale.

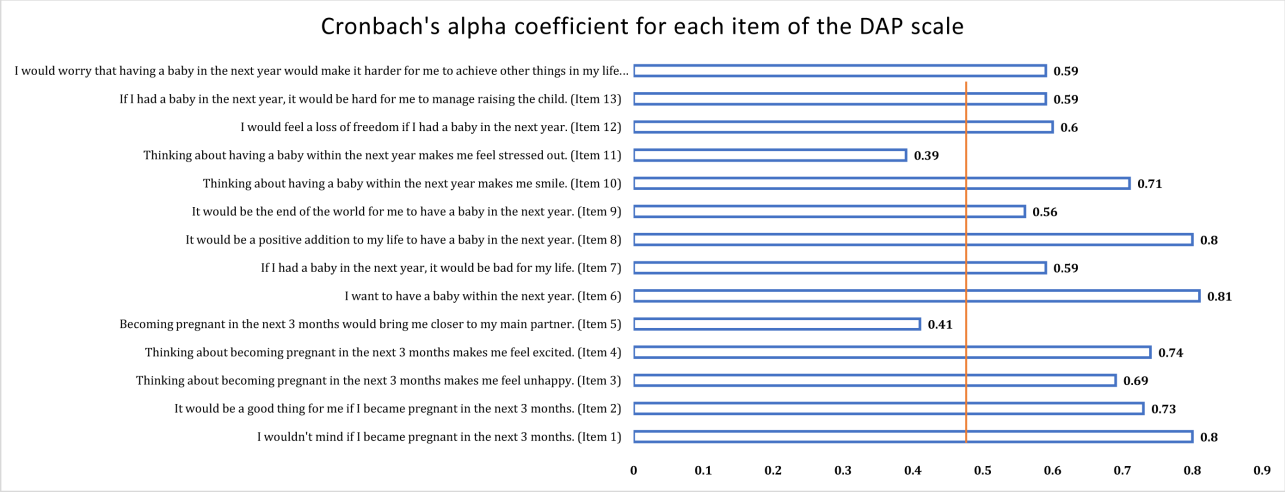

Figure 2. Reliability of each item of the DAP scale using the Cronbach's alpha coefficient Items on the left of the red line represent unacceptable reliability score.

that influenced DAP score based on partner status was the age group 20-29 years. Patients with no sexual partner in this age group has a higher mean DAP score compared to patients without a sexual partner as shown in Table 1.

3.6. Factors Associated with Desire to Avoid Pregnancy (DAP)

Factors that were positively associated with DAP score were being a student (b = 0.32, 95% CI [0.21, 0.95], p = 0.003), monthly income ≥ 100,000 FCFA (b = 0.24, 95% CI [0.07, 0.81], p = 0.022), and no sexual partner (b = 0.26, 95% CI [0.11, 0.85], p = 0.012) as shown in Table 2.

Table 1. Comparing the DAP score and selected variables in patients based on partner status.

Variables	DAP Score ± Standard Deviation (SD)		p-value
	SP1 (n = 40)	SP0 (n = 37)	
Attained tertiary education (n = 38)	1.22 ± 0.78	1.93 ± 0.71	1.000
Single marital status (n = 70)*	1.25 ± 0.76	1.99 ± 0.86	--
Pregnant before (n = 26)	1.45 ± 0.91	1.48 ± 0.77	1.000
Student (n = 36)	1.51 ± 0.74	2.37 ± 0.58	1.000
Monthly income ≥ 100,000 FCFA (n = 43)	1.46 ± 0.83	2.24 ± 0.83	1.000
Aged 20 - 29 years (n = 48)	1.44 ± 0.91	1.86 ± 0.86	**0.048**
Less than 10 VOCs/year (n =)	1.35 ± 0.86	1.91 ± 0.90	0.085
≥1 transfusion (s)/year (n = 28)	1.37 ± 0.99	2.04 ± 0.84	0.532
≥1 hospitalisations/year (n = 55)	1.17 ± 0.87	2.02 ± 0.94	0.313
Late menarche (n = 16)	0.97 ± 0.56	1.75 ± 0.98	0.862
Abnormal menstrual cycle (n = 6)	0.69 ± 0.27	2.36 ± 0.30	0.240

REF = Reference group which represent categories that are opposite to the stated risk groups (more likely to have a low desire to avoid pregnancy). DAP = Desire to avoid pregnancy scale. SD = Standard deviation. SP1 = Patients that have a sexual partner. SP0 = Patients that do not have a sexual partner. Bold values represent variable with $p < 0.05$ (significance). *Insufficient data to run a regression analysis.

Table 2. Comparing the DAP score and selected variables in patients based on risk groups.

Variables	DAP score in Risk group	DAP score in REF group ± SD	Univariate analysis		Multivariable analysis	
			b [95% CI]	p-value	b [95% CI]	p-value
Attained tertiary education (n = 38)	1.48 ± 0.82	1.79 ± 0.96	−0.17 [−0.72, 0.11]	0.150	-	-
Single marital status (n = 70)	1.64 ± 0.89	1.46 ± 1.25	0.05 [−0.66, 1.03]	0.658	-	-
Pregnant before (n = 26)	1.46 ± 0.85	1.15 ± 0.77	−0.13 [−0.71, 0.2]	0.266	-	-
Contraceptive use (n = 13)*	1.63 ± 0.76	1.13 ± 0.86	–	-	-	-
Student (n = 36)	2.05 ± 0.84	1.26 ± 0.81	0.44 [0.41, 1.18]	<0.001	0.32 [0.21, 0.95]	0.003
Monthly income ≥ 100,000 FCFA (n = 43)	1.92 ± 0.91	1.25 ± 0.78	0.37 [0.27−1.07]	0.001	0.24[0.07, 0.81]	0.022
Aged 20 - 29 years (n = 48)	1.64 ± 0.90	1.61 ± 0.95	0.02 [−0.41, 0.47]	0.898	-	-
Less than 10 VOCs/year (n = 62)	1.64 ± 0.92	1.61 ± 0.90	0.01 [−0.53, 0.58]	0.927	-	-
≥1 transfusion (s)/year (n = 28)	1.66 ± 0.97	1.61 ± 0.88	0.21 [0.39, 0.48]	0.838	-	-
≥1 hospitalisations/year (n = 55)	1.65 ± 0.99	1.58 ± 0.67	0.04 [0.39, 0.55]	0.739	-	-
Late menarche (n = 16)	1.36 ± 0.87	1.71 ± 0.91	−0.16 [−0.85. −0.17]	0.183	-	-
Abnormal menstrual cycle (n = 6)	1.36 ± 0.94	1.65 ± 0.91	−0.08 [−1.14, −0.55]	0.487	-	-
No sexual partner (n = 37)	1.99 ± 0.86	1.28 ± 0.82	0.39 [0.32, 1.1]	0.001	0.26 [0.11, 0.85]	0.012

DAP = Desire to avoid pregnancy scale. SD = Standard deviation. b = Standardised coefficient of regression. Bold values represent variable with $p < 0.05$ (significance). CI = Confidence interval. *Insufficient data to run a regression analysis.

4. Discussion

Given that unplanned pregnancies are more likely to result in adverse maternofetal outcomes, we sought to investigate pregnancy preferences in female patients with sickle cell disease to promote healthy conception and childbirth in this vulnerable population. From this study, we note that most female patients with SCD have a low desire to avoid pregnancy. Nonetheless, being a student, having a monthly income ≥ 100,000 FCFA and not having a sexual partner were associated with higher desires to avoid pregnancy.

Even though several students have unprotected sex with opposite-sex partners, they tend to have a strong intention to avoid pregnancy. Aside from the obvious low financial power associated with being a student, this finding may be explained by the fact that pregnancy could make it significantly more difficult for students to finish their degrees within specific time intervals [28]. Other professions are usually associated with older age and better economic power. These women are assumed to have more time to plan for their pregnancy, carry-on pregnancies till term and take adequate care of their children. Therefore, it would be expected that non-students have a lower desire to avoid pregnancy as shown in our study.

It could be believed that women with higher economic power can overcome more financial challenges associated with high-risk pregnancies and therefore may be more willing than others to desire and plan pregnancies. In our study, however, women who had relatively higher economic power also had higher desires to avoid pregnancy as reported by some authors [29]. This finding may be explained by contraceptive use. Many studies in the developing world have reported that wealthier women are more likely than their less wealthy counterparts to use family planning methods and maternal health care services [30] [31] [32]. In our study, though not statistically significant, patients who reported contraceptive use had a higher DAP score compared to patients that did not report contraceptive use (1.63 ± 0.76 vs 1.13 ± 0.86) as similarly reported by other authors [23]. Therefore, it is plausible that contraceptive use constituted a significant confounding variable in our study.

From our study, partner status had the greatest influence on mean DAP score (b = 0.26). Patients who had a sexual partner had a mean DAP score of 1.28 ± 0.82 while patients who had no sexual partner had a mean DAP score of 1.99 ± 0.86. This translates into the fact that people who had no partner had a higher desire to avoid pregnancy. A partner can significantly influence a woman's pregnancy preferences. In a US study, women without sickle cell disease who did not have a partner had a DAP score of 2.54 ± 0.93 (vs 1.86 ± 1.03) [23], which is much higher than DAP score in patients with SCD without a partner (1.99 ± 0.86). The lower desire to avoid pregnancy in patients with SCD compared to the overall population is multifaceted and may be influenced by the woman's knowledge or perception of her partner's reproductive wishes and by the lack of a suitable life partner who is compatible, accepts her illness and is supportive [33].

Whenever a suitable life partner sets in, the fear of not getting a better alternative may influence their pregnancy preferences at any given time.

The mean DAP score in our sample was 1.63 ± 0.91. This value is at the lower end of the DAP score and implies that most female patients with sickle cell disease had a low desire to avoid pregnancy. This contrasts with the mean DAP score (2.53 ± 1.05) obtained in UK women without sickle cell disease. In 2021, fertility rate in Cameroon was 4.5 births per woman, 0.8 in China, 1.4 in Greece, 1.6 in Germany, 1.7 in USA and 1.8 in France [34]. Though this high birth rate has been attributed to unintended pregnancies, the lower DAP score in our study may imply that a good proportion of these pregnancies in Cameroon may be intended. Reports suggest that Black women are less inclined to decline sex with a partner, have a negative attitude about contraception, are more likely to anticipate having sex without contraception than white women and anticipate more favourable outcomes if they get pregnant at a certain point in their life [35]. The DAP scale has not been studied extensively in African setting and therefore comparing our values with context-specific studies is quite difficult. Nonetheless, our finding correlates with trends described in African settings before [36] [37] with 59.8% of Cameroonian women of reproductive age preferring to space rather than limit pregnancies [37].

The non-probabilistic sampling methods used in this study, the unacceptable reliability of some individual score items (e.g. 5 and 11), the cross-sectional nature of the study constitutes significant limitations to the study's generalizability. Nonetheless, our study is the first to evaluate pregnancy preferences in sickle cell population using a validated tool in Africa.

More studies evaluating pregnancy preferences (using the DAP score or other tools like the One Key Question® tool [38]) to predict onset of pregnancy in the near future and exploring maternofetal outcomes of pregnancies in females with sickle cell disease need to be conducted. Conception is central for every culture, especially African culture, and therefore, efforts to tailor conception care to individual patient's needs, including for female patients with SCD, should be promoted.

5. Conclusions

In summary, the mean DAP score for female patients with SCD was low, denoting a low desire to avoid pregnancy. Being a student, having a monthly income ≥100000FCFA and not having a sexual partner were associated with higher desires to avoid pregnancy. The DAP score is a promising tool to evaluate pregnancy preferences in Cameroon.

What is known about the topic?

- Females with sickle cell disease (SCD), despite having a delayed pubertal development, are subject to many worries relating to their abilities to conceive, their capacity to maintain a materno-foetal-risk-free pregnancy till term and give birth to healthy children without sickle cell disease.

- There is a lack of prior research on specific aspects of pregnancy preferences (e.g., desired timing) in SCD population globally.
- The Desire to Avoid Pregnancy (DAP) is a promising tool to evaluate these preferences and has seldom been used in resource-limited settings.

What this study adds?

- Most female patients with SCD have a low desire to avoid pregnancy. Most patients (46.0%) responded "Strongly Agree" or "Agree" to the statement "it would be a good thing for me if I became pregnant in the next 3 months.
- Being a student, having a monthly income ≥100000FCFA and not having a sexual partner were associated with higher desires to avoid pregnancy.
- The total DAP score has good reliability (0.92) and therefore is a promising tool to evaluate pregnancy preferences in Cameroonian women with sickle cell disease.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author, CEE.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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