



Polish medical students' awareness about reproductive physiology

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Abstract: *Introduction:* Falling fertility rates and prevalence of infertility become serious problems of public health that affect families all over the world. Both men and women are delaying parenthood for several reasons, such as undertaking further education, pursuing careers, travelling, finding a partner later in life and facing the challenges of establishing secure finances and housing. Unfortunately their fertility declines with age and this awareness may influence the prioritization of life plans. Medical students are specially dedicated to promote health literacy in their future practice as well as in their private life. Aim of the study and methodology Aim of this study was to examine Polish medical students' awareness about the basic reproductive physiology. It was based on on-line authors' own questionnaire among 445 female and 97 male medical students of a mean age 22.3 years from 13 Polish medical universities. Results It showed that awareness of basic fertility physiology is on a relatively high level what can be promising. Students who plan to start a family in the future have the highest overall mean score of correct answers (83%). Statistically lower levels of knowledge about fertility is presented by the students that have no decision about the future family or do not want to raise a family (80% and 72% respectively). The results seem to be similar irrespective of the participants' gender, year of study, sexual activity and potential pregnancy prevention method. Conclusions It is still essential to introduce modern knowledge about fertility care and prophylaxis issue among future medical staff, so that they will properly take care of their health and educate their patients.

Keywords: fertility awareness, infertility, natural family planning, reproductive physiology

Introduction

Falling fertility rates and prevalence of infertility become serious problems of public health that affect people all over the world. According to the most recent WHO report, around 17.5% of the adult population – 1 in 6 worldwide – experience infertility (World Health Organization, 2023). The age of the first conception is rising globally, in Poland it is getting close to 30 years old, while in many countries it is even higher (World Population Review, n.d.). Delaying the parenthood might have several reasons. Among updated literature they are mentioned sociological reasons like: difficulty in establishing stable relationships, long education process, economical reasons: demanding labour condition and instability, medical ones: use of contraception and decreasing male fertility as well as lack of health literacy especially concerning fertility

awareness. (Babakhanzadeh, 2020; Nazaré, 2022). In addition, it is the health problems that force couples to postpone family planning regardless of their will. Many people are unaware of their own fertility potential, the limitations on their fertility as well as of the symptoms or preventable causes of fertility problems (Harper et al., 2017). Understanding the basics of the reproductive cycles and fertility are essential not only for family planning, but also for observation of female body and its health. Enhancing health literacy can facilitate its application in diagnosing and treating gynecological issues, such as infertility. Great tools for improving fertility knowledge are Fertility Awareness-based Methods (FAMs), based on self-observation of natural signs and symptoms of the cycle as well as on new technology monitors

which help to distinguish whether the woman's cycle phase is fertile or not. It can also assist women in recognizing signs of any health issues in their bodies (Smoley, Robinson, 2012). Unfortunately, according to our study, the knowledge about FAMs among future medical professionals is incomplete. Even though most of the medical students in the study agree with the value of FAMs, the research showed they barely use these tools. What is more, students presented incomplete knowledge about modern FAMs, with a possible reason of residual information about them in the medical textbooks or lectures (Zgodzińska et al., 2023). This knowledge is insufficient not only among users but also among clinicians themselves (Ibeziako, 2022). In our study we examined if Polish medical students' show adequate awareness about basic reproductive physiology and the factors that might influence it. It seems essential for future professionals to know basics of these topics in order to properly take care of their patients, and help them prevent decrease in fertility and postponing pregnancy at least from the medical perspective.

1. Materials and methods

To check the students' knowledge about fertility, a diagnostic survey was created, using online authors' own questionnaire. It contained closed-ended questions of single or multiple choice. From March to May 2022 445 female and 97 male medical students participated in the study. The mean of age of respondents was 22.3 years \pm 2.11 SD with the range of 19-39 years. Among the participants, 361 (66.7%) students came from the urban areas while 181 (33.3%) from the rural areas. Majority of students were unmarried (518; 95.4%) and sexually active (331; 61.0%). Our study reached medical students from 13 Polish cities: Lublin (221), Wrocław (91), Łódź (60), Warszawa (55), Białystok (37), Poznań (19), Kraków (18), Zabrze (14), Olsztyn (12), Katowice (9), Rzeszów (2), Szczecin (1) and Gdańsk (1). Two students did not state the city of their studies. One person replied not to be a student, so the questionnaire was rejected and this person was not included to our statistics.

The questionnaire was widespread through the online student groups to reach the participants. The questions were divided into three groups — "Physiology of the Menstrual Cycle and Fertility", "Reproductive Health" and "Fertility Awareness-based Methods and Family Planning". The part analyzed in this study — „Reproductive health” — included seven basic questions related to the topic.

The participants' characteristics underwent a descriptive analysis. Continuous variables were presented as means \pm standard deviations (SD), and categorical variables were presented as the numbers and percentages of individuals. A two proportion Z-test was used to compare the answers of the groups of participants. Differences with a p-value less than 0.05 were considered significant. The data was analyzed using the RStudio ver. 1.1.463 software (Boston, MA, USA).

2. Results

The total of correct answers on the questions is presented on Figure 1. 93% (n = 503) of the students correctly recognized the first day of female cycle and 90% (n = 488) the correct length of it. Almost every participant (over 99%, n = 541) knew the meaning of the term „ovulation”, while 84% (457) properly indicated when it occurs within a cycle. 69% (n = 375) of respondents were aware of the time during which the egg cell is alive and capable of being fertilized, while 50% (n = 273) knew how long sperm retains their ability to fertilize in the reproductive tract of a woman.

Table 1. shows the differences in the knowledge between students of different family plans. The most accurate answers for questions about the length of the cycle, time of ovulation and length of life of an egg cell were given by family-planning students (90%, 86% and 70% respectively). At the question of the length of the life of a sperm, non-family-planning students had the most correct answers (55%). Non-family planning students had more correct answers than students with no decision about their future family life at the question about when ovulation occurs (79%, 75% respectively). However, students with no

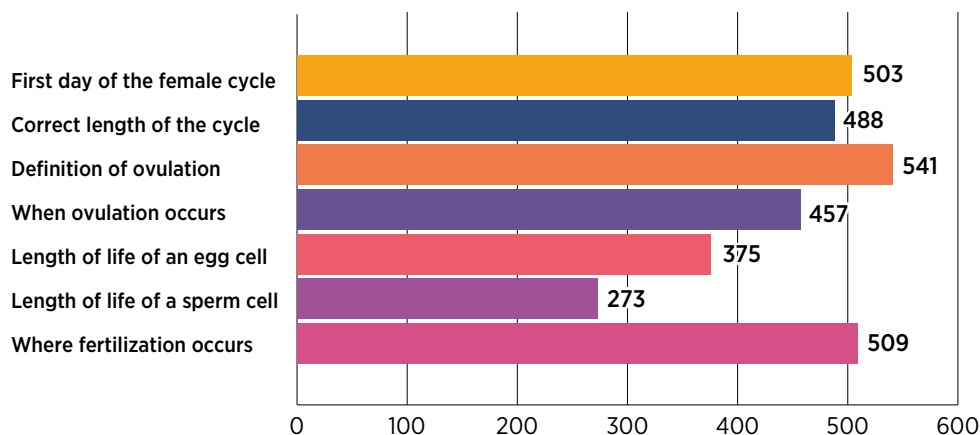


Figure 1. Correct answers in total.

family decision were more accurate than no-family students in the questions about the length of the cycle (85%, 69%) and the length of the life of the egg cell (65%, 64% respectively).

To summarize, students who plan to start a family in the future have the overall mean score of 83% correct answers. Lower levels of knowledge about fertility is presented by the students that have no decision about the future family or do not want to raise a family (80% and 72% respectively). All of the correct answers in our questionnaire stands for about 78%.

Table 1. Correct answers between students of different family plans

Question	Family-planning students (n=421)	Non-family planning students (n=42)	Students with no decision (n=79)	p
First day of the female cycle	392	33	75	0.901
Correct length of the cycle	380 (90%)	29 (69%)	67 (85%)	0.002
Definition of ovulation	420	34	79	0.3897
When ovulation occurs	361 (86%)	33 (79%)	59 (75%)	0.00068
Length of life of an egg cell	296 (70%)	27 (64%)	51 (65%)	<0.0001
Length of life of a sperm cell	213 (51%)	23 (55%)	38 (48%)	<0.0001
Where fertilization occurs	397	32	73	0.0793

Differences between males and females' correct answers are presented in the Table 2. Female participants were significantly more accurate than male participants in choosing the factual first day of female cycle having respectively 97% (n = 430) and 75% (n = 73) correct answers. Women were also correct about the length of life of an egg cell more often than men, having 73% (n = 324) and 53% (n = 51) proper answers respectively. The results seem to be irrespective of the participants' year of study, sexual activity and potential pregnancy prevention method.

Discussion

The aim of this study was to examine the polish medical students' awareness about basic reproductive physiology.

In a systematic review on fertility awareness of Pedro et al. seventy one articles were included in the analysis and they showed low (<40% of correct answers) to moderate fertility awareness (40-60%) in general population (Pedro et al., 2018). In the study of Chawłowska et al., where polish female students were examined, 55,8% answers were correct and students of medicine reached the highest score (Chawłowska et al. 2020). Our research showed the level of knowledge of polish medical students at about 78%. This might indicate that medical studies help to increase the knowledge about fertility. The dominance of medical students' results over non-medical students is also showed by some other studies (Nouri et al., 2014).

Table 2. Correct answers between women and men

Question	Females n = 445	Males n = 97	p
First day of the female cycle	430 (97%)	73 (75%)	<0.0001
Correct length of the cycle	398	90	0.4181
Definition of ovulation	445	96	0.4019
When ovulation occurs	382	75	0.05267
Length of life of an egg cell	324 (73%)	51 (53%)	0.0001512
Length of life of a sperm cell	229	44	0.3287
Where fertilization occurs	421	88	0.2241

According to Pedro et al. in general population higher levels of fertility awareness were shown by women (Pedro et al., 2018). In a systematic review of Yue Ren et al, female medical students showed higher levels of FA than other student groups (Ren et al., 2023). Our research showed that the level on fertility knowledge was similar in male and female medical students, but women were more accurate than men in some areas. They chose the first day of the female cycle better as well as the total length of a life of an egg cell. Such results can be based on the fact that women actually menstruate, so they have some knowledge from their reality in comparison to men.

In the study of Warzecha et al. twenty thousand polish women were examined in terms of sexual education. The level of knowledge about fertility among polish women was found to be quite satisfying, as 62.2% of the women gave correct answers to at least 5 of 7 questions about the physiology of the menstrual cycle. Three factors had a significant impact on the women's number of correct answers: higher education, more frequent gynecological appointments, and living in a larger city (Warzecha et al. 2019). Although the level of knowledge of polish women seems satisfying, there is still a need to share high quality medical knowledge, especially to smaller centers. Usually the topics of fertility and sexuality seems to still be a taboo in such places (Warzecha et al., 2019). In the study of Kazem et al. gender did not affect estimated knowledge independently. The cor-

relation, though, was found between healthy lifestyle and female gender with higher fertility awareness (Nouri et al. 2014).

Along with Pedro et al. study having or desiring to have children was not related to fertility awareness level. However, people who planned their pregnancies showed better fertility awareness (Pedro et al., 2018). In our study different family plans affected the answers of the participants. Statistically, the questions about the length of a female cycle, time of the ovulation and the length of the life of an egg cell were more correct in the group of participants who plan to have children in the future. Interestingly, non-family-planning students gave the most accurate answers in comparison to other groups on the question about the length of life of a sperm cell (55%). It seems that either desire or avoidance of pregnancy leads the medical students to broaden their knowledge about fertility. In the study of Rachel Okine et al on students of different fields, majority participants planned to delay childbearing. Yet, participants demonstrated limited knowledge regarding age-related decline in fertility and underestimated the risk of miscarriage in older women. The study found that along with delay plans particularly female medical students declare anxiety about their future fertility and show will of receiving the information about fertility. These discordant conclusions underline a crucial need for education in the field of fertility during studies (Okine et al., 2023).

In the general population higher fertility awareness was reported to relate to people with difficulties with conceiving in the past (Pedro et al., 2018). According to our research, sexual activity and potential pregnancy prevention method did not affect the answers of the participants. Our study showed, though, that students have poor knowledge about modern Fertility Awareness Based Methods, which are based on human physiology and help not only to plan pregnancy but also rise awareness about ones own body and overall health. Among the declared well-known Natural Family Planning methods were the ones of historical importance, like the Calendar Method, or their modern equivalents for instance phone applications, on the contrary to the modern methods (ex. The Billings Method, Creighton Model

System, Multi Index Method) (Zgodzińska et al., 2023). It can be predicted that the raise of knowledge about fertility might encourage medical students and future doctors to use and recommend FABM.

In Pedro et al. study an inconsistent association between participant age and fertility awareness was observed, with some studies showing that older participants had better knowledge, but other found an opposite result or no association. As far as the year of study is concerned, higher levels of fertility awareness were shown by highly educated individuals (Pedro et al., 2018). In our research results seem to be irrespective of the participants' year of study. This can be explained by the fact that gynecological topics come up on different years of medical studies. Our study showed that the most popular source of knowledge about fertility is the Internet and medical textbooks (Zgodzińska et al., 2023). Results were similar in the study of Halczuk et al, in which most participants had also expressed the opinion that the parents should be the most appropriate source of knowledge about human sexuality (Halczuk et al., 2019). This means that not only medical staff should be more aware to share the knowledge to the patients, but also encourage parents to talk with their children about fertility related topics.

According to the study of Grace et. al. in UK, healthcare professionals were ranked as the most trusted source for seeking fertility information. However, they did not show better fertility knowledge than lay participants in the study. That is why medical staff should improve their knowledge about fertility to help raise patient's fertility awareness (Grace et al., 2023).

Conclusions

The findings of our study shed light on the awareness of Polish medical students regarding reproductive physiology, an essential aspect of public health and medical practice. Health literacy must include fertility awareness which creates special milieu for health

education, also or especially among medical staff. Our study reveals a relatively high level of awareness among Polish medical students regarding basic fertility physiology. The majority of participants demonstrated accurate knowledge about key aspects such as the first day of the female cycle, ovulation, and fertilization. Students who expressed intentions of starting a family in the future exhibited better knowledge about fertility physiology compared to those who had not yet made a decision or did not desire to have a family. While overall knowledge levels were similar between male and female medical students, women tended to be more accurate in certain areas, what might come from their personal experiences with menstruation. Despite the relatively high awareness levels observed, there is still room for improvement, particularly in understanding modern Fertility Awareness-based Methods (FAMs). Medical education should focus on providing comprehensive knowledge about these methods, which can aid not only in family planning but also in promoting overall health awareness. In education attention should be also drawn to the problem of postponing pregnancy and relying on assisted reproductive technology (ART). These days, late-age conceptions tend to be underlined as successful, creating the misconception that ART can fully counteract age-related fertility decline (Mills et al., 2015). However, according to CDC data from 2021, IVF success rate decreases with age, from 36% live births per embryo transferred in patients under 35 years old to 10% in women above 40 years old (National Center for Chronic Disease Prevention and Health Promotion, 2021). Consequently, many people find they have unintentionally missed their optimal reproductive window (Berrington, 2004). Healthcare professionals play a crucial role in educating patients about these realities, especially because they are considered trusted sources of fertility information. Our study highlights the importance of holistic education on reproductive health, not only within medical curricula but also within families and communities.

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