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ROZPRAWA DOKTORSKA

Ocena występowania symptomów lęku przed COVID-19 wśród kobiet ciężarnych

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DOCTORAL THESIS

Assessment of the occurrence of symptoms of fear of COVID-19 among pregnant women

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SPIS TREŚCI

1. Życiorys **4**
2. Zestawienie dorobku naukowego **7**
3. Zestawienie publikacji wchodzących w skład rozprawy doktorskiej **8**
4. Wstęp **9**
5. Cele rozprawy doktorskiej **12**
6. Publikacja nr 1 ..... **13**
6.1. Materiał i metody 13
6.2. Wyniki 14
7. Publikacja nr 2 ..... **15**
7.1. Materiał i metody 15
7.2. Wyniki 16
8. Wnioski **18**
9. Kopie publikacji wchodzących w skład rozprawy doktorskiej **19**
9.1. Artykuł nr 1 19
9.2. Artykuł nr 2 28
10. Streszczenie w języku polskim **41**
11. Streszczenie w języku angielskim **42**
12. Wykaz piśmiennictwa **43**
13. Oświadczenie autora **47**
14. Oświadczenia współautorów **49**
15. Zgody Komisji Bioetycznej **55**

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5. **Janik K.**, Cwalina U., Iwanowicz-Palus G., Cybulski M.: An Assessment of the Level of COVID-19 Anxiety among Pregnant Women in Poland: A Cross-Sectional Study. J Clin Med. 2021; 10(24): 5869 (4.964 IF, 140 pkt MEiN).
6. **Janik K.,** Nietupska K., Iwanowicz-Palus G., Cybulski M.: Fear of COVID-19 and Vaccine Hesitancy among Pregnant Women in Poland: A Cross-Sectional Study. Vaccines. 2022; 10(10): 1700 (7.800 IF, 140 pkt MEiN).
7. **Janik K.**, Iwanowicz-Palus G., Cybulski M.: The Impact of the COVID-19 Pandemic on Health Behaviours of Pregnant Women in Poland: A Cross-Sectional Study. Nutrients. 2024; 16(1): 88 (4.800 IF, 140 pkt MNiSW).

WYKAZ WYSTĄPIEŃ KONFERENCYJNYCH

1. **Janik K.:** Ocena poziomu lęku przed COVID-19 wśród ciężarnych – badanie pilotażowe. II Ogólnopolska Konferencja Naukowa "Wieloaspektowa rzeczywistość pandemii COVID-19 – wyzwania społeczne, gospodarcze i prawne" (online); 19 maja 2022.
2. **Janik K.,** Nietupska K., Iwanowicz-Palus G., Cybulski M.: Assessment of COVID-19 anxiety levels and attitudes to COVID-19 vaccine among pregnant women in Poland. 31st European Congress of Psychiatry "Social Cohesion, a Common Goal for Psychiatry"; Paris, France, 25-28 March 2023.

WYKAZ ZREALIZOWANYCH PROJEKTÓW NAUKOWYCH W RAMACH SZKOŁY DOKTORSKIEJ

Numer projektu (rok)	Tytuł projektu
SUB/3/DN/21/008/3310 (2021 rok)	„Ocena występowania symptomów lęku przed COVID-19 wśród kobiet ciężarnych"
SUB/3/DN/22/011/3310 (2022 rok)	„Ocena występowania symptomów lęku przed COVID-19 i postrzeganie szczepień przeciwko COVID-19 wśród kobiet ciężarnych"
B.SUB.23.143 (2023 rok)	„Wpływ pandemii na wybrane aspekty zachowań zdrowotnych kobiet ciężarnych"

2. ZESTAWIENIE DOROBKU NAUKOWEGO

Rodzaj publikacji	liczba	Impact Factor	Punkty MEiN/MNiSW
Prace włączone do rozprawy doktorskiej	2	12.764	280
Prace, które nie zostały włączone do rozprawy doktorskiej - powiązane z tematem głównym	1	4.800	140
Pozostałe prace	4	-	80
Łącznie	**7**	**17.564**	**500**

3. ZESTAWIENIE PUBLIKACJI WCHODZĄCYCH W SKŁAD ROZPRAWY DOKTORSKIEJ

- **PUBLIKACJA NR 1**

  An Assessment of the Level of COVID-19 Anxiety among Pregnant Women in Poland: A Cross-Sectional Study.

  Kinga Janik, Urszula Cwalina, Grażyna Iwanowicz-Palus, Mateusz Cybulski

  Journal of Clinical Medicine 2021; 10(24): 5869.

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  Fear of COVID-19 and Vaccine Hesitancy among Pregnant Women in Poland: A Cross-Sectional Study.

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  Data publikacji: 11.10.2022 r.

4. WSTĘP

Pod koniec 2019 r. w chińskiej prowincji Wuhan pojawiła się seria przypadków zapalenia płuc o nieznanej przyczynie [1]. Kilka tygodni później, w styczniu 2020 r., analiza próbek laboratoryjnych zidentyfikowała nowego wirusa SARS-CoV-2, wywołującego ostrą chorobę układu oddechowego [2], która 11 lutego 2020 r. została nazwana przez dyrektora generalnego Światowej Organizacji Zdrowia (*World Health Organization*, WHO) jako COVID-19. 11 marca 2020 r. WHO ogłosiła status pandemii [3], która oficjalnie zakończyła się z dniem 1 lipca 2023 r. [4]. Do tej pory naukowcy wyodrębnili wiele odmian koronawirusa. W Polsce pandemia przebiegała w sześciu falach z głównym udziałem odmian: Alfa, Beta, Gamma, Delta i Omikron.

Do dnia 18 sierpnia 2024 r. na świecie potwierdzono 776 007 137 przypadków zachorowania na COVID-19, z czego liczba potwierdzonych zgonów wyniosła 7 059 612. Łączna podana liczba dawek szczepionki przeciwko COVID-19 do dnia 31 grudnia 2023 r. wyniosła 13,64 mld. Z danych podanych na dzień 31 grudnia 2023 r. wynika, że odsetek całej światowej populacji zaszczepionej pełną podstawową serią szczepionki przeciwko COVID-19 wyniósł 67%, natomiast odsetek ogółu populacji zaszczepionych co najmniej jedną dawką przypominającą szczepionki – 32% [5]. W Polsce, według oficjalnych danych, od początku pandemii do dnia 11 stycznia 2024 r. zdiagnozowano 6 643 818 przypadków, w tym 120 352 zgony [6]. Według stanu na dzień 3 września 2024 r. w Polsce w pełni zaszczepionych było 22 648 102 osób. W tym samym czasie wykonano 58 576 457 szczepień [7].

Początek pandemii COVID-19 był szczególnie stresujący dla kobiet w ciąży ze względu na nieznany wpływ wirusa SARS-CoV-2 na ciążę i płód oraz modyfikacje w opiece prenatalnej i praktykach porodowych, które zostały wprowadzone w celu ograniczenia transmisji koronawirusa [8].

Zmiany zachodzące w ciąży predysponują do powikłań ze strony układu oddechowego, w szczególności przy zakażeniach wirusowych, natomiast zmiany w układzie immunologicznym i sercowo-płucnym zwiększają ryzyko ciężkich powikłań infekcyjnych u kobiet ciężarnych [9].

Doświadczenie stresu przez ciężarną wpływa przede wszystkim na funkcjonowanie jej mózgu i rozwój mózgu jej dziecka. W organizmie ciężarnej stężenie kortyzolu podczas silnych doznań stresowych wzrasta niemal dziesięć razy, podczas gdy poziom hormonów płciowych zmniejsza się. Ma to destrukcyjny wpływ na neurony w ośrodkowym układzie nerwowym, prowadząc do ich atrofii w hipokampie i okolicy kory przedczołowej oraz do powiększenia

ciała migdałowatego, czyli struktur odpowiedzialnych za emocje. Emocje matki kształtują również synapsy u płodu, a neuroprzekaźniki wydzielane przez matkę modyfikują rozwój mózgu dziecka [10-12].

W licznych publikacjach znajdują się informacje o dużo większej częstości występowania objawów lękowych i depresyjnych u kobiet ciężarnych w trakcie pandemii COVID-19, niż przed pandemią [13,14]. Wielokrotnie przeprowadzone badania z udziałem kobiet ciężarnych na terenie całego kraju, w różnych falach pandemii, dowodzą umiarkowanego lub ciężkiego poziomu lęku [15-21]. Dodatkowe czynniki, związane z warunkami pandemicznymi i wynikającym z nich stresem pandemicznym, również miały wpływ na zdrowie psychiczne kobiet [16]. Zdaniem badanych, na wzrost poziomu lęku pandemicznego wpływ miały również doświadczenia macierzyńskie, przebieg poprzedniego porodu oraz stan psychofizyczny [17]. Samotne wychowywanie lub pozostawanie w nieformalnym związku również zwiększało poziom lęku wśród kobiet [18]. Wiek i status materialny, oprócz wpływu na lęk, przyczyniały się także do występowania tokofobii [20].

Wraz z rozwojem pandemii wprowadzane były kolejne obostrzenia mające ograniczyć transmisję koronawirusa, które dotyczyły również ciężarnych i rodzących. Wstrzymane zostały porody rodzinne, czyli takie, gdzie obecny jest ojciec dziecka lub inna osoba towarzysząca. Następnie Główny Inspektor Sanitarny wydał wytyczne ograniczające możliwość wizyt osób trzecich w szpitalach, nie wprowadzając żadnych wyjątków. Wpłynęło to bezpośrednio na prawo do obecności osoby bliskiej. Dotychczasowe badania pokazują, że samotny poród wiąże się z wysokim poziomem stresu i lęku u kobiet, wyższym bólem i częstszym zakończeniem porodu cesarskim cięciem [22]. Badane wskazały, że główną obawą kobiet w okresie okołoporodowym, związanym z pandemią COVID-19, była separacja od noworodka i od bliskiego krewnego, który mógłby uczestniczyć w porodzie [19].

Szczepienia przeciwko COVID-19 są najskuteczniejszą strategią zapobiegania ciężkiemu przebiegowi zakażenia wirusem SARS-CoV-2 [23], a różne badania wykazały ponad 90% skuteczność w zapobieganiu ciężkiemu przebiegowi choroby i śmiertelności [24,25]. Literatura naukowa podaje, że korzyści płynące ze szczepienia przeciwko COVID-19 przewyższają wszelkie znane lub potencjalne zagrożenia w czasie ciąży [26]. Według *Centers for Disease Control and Prevention* (CDC) nie ma dowodów sugerujących, że szczepienie przeciwko COVID-19 może być szkodliwe w czasie ciąży lub że istnieją jakiekolwiek obawy dotyczące bezpieczeństwa ciąży bądź wpływu na noworodka [27,28].

Jak podaje *European Medicines Agency*, na dzień 3 września 2024 r. na terenie Unii Europejskiej są zarejestrowane cztery szczepionki przeciwko COVID-19, w tym dwie

szczepionki mRNA: Comirnaty (Pfizer BioNTech) i Spikevax (Moderna), białkowa Bimervax (HIPRA Human Health S.L.U.) oraz białkowa rekombinowana Nuvaxovid (Novavax) [29].

W wielu światowych badaniach kobiety ciężarne wykazują dużą akceptację wobec szczepień przeciwko COVID-19, przy czym za priorytet stawiają bezpieczeństwo szczepionki wobec swoich nienarodzonych dzieci [30,31]. Istnieją też doniesienia, że pandemia COVID-19 miała pozytywny wpływ na decyzje kobiet ciężarnych o szczepieniu siebie i swoich dzieci w przyszłości [32].

5. CELE ROZPRAWY DOKTORSKIEJ

Cel główny

Ocena występowania symptomów lęku przed COVID-19 wśród kobiet ciężarnych w Polsce.

Cele szczegółowe

1. Wpływ wybranych zmiennych socjo-demograficznych na nasilenie objawów lękowych wśród kobiet ciężarnych.
2. Poznanie szczegółowych czynników, związanych z pandemią COVID-19, wywołujących niepokój wśród kobiet ciężarnych.
3. Poznanie postaw wobec szczepień przeciwko COVID-19 wśród kobiet ciężarnych.

6. PUBLIKACJA NR 1

An Assessment of the Level of COVID-19 Anxiety among Pregnant Women in Poland: A Cross-Sectional Study

6.1. MATERIAŁ I METODY

Badanie przeprowadzono w okresie od 5 kwietnia 2021 r. do 26 lipca 2021 r. W badaniu wzięły udział kobiety ciężarne na różnych etapach ciąży. W badaniu wzięły udział łącznie 173 kobiety. Udział w anonimowym badaniu był dobrowolny i równoznaczny z wyrażeniem zgody na wykorzystanie pozyskanych danych do celów naukowych. Link do kwestionariusza, stworzonego przy użyciu dedykowanego oprogramowania Webankieta (Get Feedback, Warszawa, Polska) został umieszczony w mediach społecznościowych. Odpowiedzi respondentek były rejestrowane na wykorzystywanej platformie, a następnie pobierane jako surowe dane do analizy statystycznej.

Oprócz płci żeńskiej i ciąży dodatkowym kryterium włączenia do badania była pisemna świadoma zgoda. Na przeprowadzone badania uzyskano zgodę Komisji Bioetycznej Uniwersytetu Medycznego w Białymstoku (uchwała nr APK.002.248.2021 z dnia 29 kwietnia 2021 r.).

Badanie przeprowadzono przy wykorzystaniu metody sondażu diagnostycznego. Do przeprowadzenia badania użyto autorskiego kwestionariusza ankiety, sporządzonego specjalnie dla potrzeb niniejszego badania. Zawierał on pytania dotyczące charakterystyki społeczno-demograficznej oraz szczegółowe pytania dotyczące czynników stresogennych w odniesieniu do aktualnej sytuacji epidemiologicznej zakażeń koronawirusem SARS-CoV-2. Dodatkowo, wykorzystano następujące standaryzowane skale badawcze: Inwentarz Stanu i Cechy Lęku (*State-Trait Anxiety Inventory*, STAI), Inwentarz Lęku o Zdrowie (*Short Health Anxiety Inventory*, SHAI) i Kwestionariusz Lęku Uogólnionego (*General Anxiety Disorder-7*, GAD–7).

Do opracowania wyników wykorzystano program Statistica 13.3 (StatSoft Polska, Kraków). Analizowane zmienne miały charakter dychotomiczny, przedziałowy oraz porządkowy. W przypadku zmiennych dychotomicznych wykorzystano test chi-kwadrat. W analizie wyników przedziałowych posłużono się podstawowymi statystykami opisowymi. Istotność statystyczną określano za pomocą testu U Manna-Whitneya. Przyjęto poziom istotności statystycznej $p < 0,05$ dla każdego testu.

6.2. WYNIKI

Uzyskane wyniki wykazały, że zachorowanie na COVID-19 w czasie ciąży miało wpływ na obawy przed ponownym zakażeniem się SARS-CoV-2 w czasie ciąży. Strach przed zachorowaniem na COVID-19 zgłosiło 30,77% kobiet, które przebyły COVID-19 i ponad 50% kobiet z grupy, które nie zachorowały na COVID-19. Szczegółowa analiza wyników GAD-7 wykazała, że całkowity wynik wskazywał na objawy lękowe o różnym nasileniu u 71% respondentek. Łącznie 23 (13,3%) respondentek uzyskało co najmniej 10 pkt, co sugeruje podejrzenie uogólnionego zaburzenia lękowego. Średni wynik uzyskany przez respondentki wyniósł 13,29 pkt dla skali SHAI. W skali GAD-7 większość respondentek uzyskała od 5 do 9 pkt. Średnie wyniki uzyskane w STAI-XI i STAI-X2 były podobne, tj. odpowiednio 42,26 pkt i 40,24 pkt.

Pierworódki miały statystycznie istotnie (p = 0,031) wyższe wyniki SHAI (M = 14,45, Me = 14) w porównaniu do wieloródek (M = 12,22, Me = 12). Kobiety z wyższym wykształceniem uzyskały istotnie statystycznie wyższe wyniki w SHAI (p = 0,019, M = 14,17, Me = 13) i GAD-7 (p = 0,006, M = 6,31, Me = 6). Nie wykazano istotnych statystycznie wyników dla pozostałych skal.

Hospitalizowane kobiety w ciąży uzyskały znacznie wyższy wynik w skali STAI-X1. Nie stwierdzono statystycznie istotnych różnic w pozostałych skalach między kobietami w ciąży, hospitalizowanymi w czasie ciąży, a tymi, które nie wymagały hospitalizacji.

7. PUBLIKACJA NR 2

Fear of COVID-19 and Vaccine Hesitancy among Pregnant Women in Poland: A Cross-Sectional Study

7.1. MATERIAŁ I METODY

Badanie objęło 288 kobiet na różnych etapach ciąży (grupa badana) i 307 kobiet w wieku rozrodczym (grupa kontrolna). W badaniu wzięło udział łącznie 595 kobiet.

W badaniu wykorzystano autorski kwestionariusz ankiety, opracowany na potrzeby niniejszego badania. Zawierała ona pytania dotyczące cech społeczno-demograficznych oraz szczegółowe pytania dotyczące przebytej infekcji COVID-19, szczepienia i opinii na temat szczepionki przeciwko COVID-19. Oprócz pytań dotyczących cech społeczno-demograficznych ankieta zawierała 8 pytań zamkniętych, 4 pytania jednokrotnego wyboru i 4 pytania wielokrotnego wyboru. Wykorzystano ponadto następujące standaryzowane narzędzia badawcze: dwie Skale Lęku przed Koronawirusem (*The Fear of COVID-19 Scale*, FCV-19S i *Coronavirus Anxiety Scale*, CAS), Skalę Wskaźników Akceptacji Szczepień Przeciwko COVID-19 (*The Drivers of COVID-19 Vaccination Acceptance Scale*, DrVac-COVID-19S) oraz Skalę do Pomiaru Postrzegania Akceptacji Szczepionek Przeciwko SARS-CoV-2 (*Scale to Measure the Perception of SARS-CoV-2 Vaccines Acceptance*, The VAC-COVID-19 Scale).

Badanie przeprowadzono w okresie od 5 lutego 2022 r. do 20 kwietnia 2022 r. Link do dedykowanej ankiety na platformie Webankieta został zamieszczony w mediach społecznościowych w grupach dyskusyjnych dedykowanych kobietom w ciąży (grupa badana) oraz grupach dyskusyjnych skierowanych do młodych matek i kobiet w wieku rozrodczym (grupa kontrolna). Zainteresowane kobiety mogły dobrowolnie wziąć udział w ankiecie on-line. Odpowiedzi zostały zarejestrowane na platformie, a następnie pobrane jako surowe dane i poddane analizie statystycznej przy użyciu dedykowanego specjalistycznego oprogramowania.

Udział w anonimowym badaniu był dobrowolny i równoznaczny z wyrażeniem zgody na wykorzystanie uzyskanych danych do celów naukowych. Trwająca ciąża była jedynym kryterium włączenia do grupy badanej. Każda uczestniczka mogła wycofać się z badania w dowolnym momencie jego trwania. Kryterium włączenia do grupy kontrolnej był wiek od 18 do 49 lat.

Na przeprowadzone badania uzyskano zgodę Komisji Bioetycznej Uniwersytetu Medycznego w Białymstoku (uchwała nr APK.002.55.2022 z dn. 20 stycznia 2022 r.).

Do analizy statystycznej wykorzystano program Statistica 13.3 (StatSoft Polska, Kraków). Analizowane zmienne miały charakter nominalny, przedziałowy lub porządkowy. Do oceny zależności pomiędzy cechami nominalnymi wykorzystano test chi-kwadrat. Dla zmiennych przedziałowych wykorzystano współczynnik korelacji rang Spearmana. W celu porównania dwóch grup przeprowadzono test U Manna-Whitneya. Dla większej liczby grup zastosowano test Kruskala-Wallisa z testami post-hoc. Dla każdego testu istotność statystyczną ustalono na poziomie $p < 0,05$.

7.2. WYNIKI

W grupie badanej odsetek zaszczepionych kobiet był znacznie niższy (51%) niż w grupie kontrolnej (72%), zaś liczba zaszczepionych (51%) i niezaszczepionych (49%) kobiet w ciąży w grupie badanej była podobna.

Przeprowadzona analiza wykazała, że częstość występowania COVID-19 była istotnie niższa wśród kobiet w ciąży niż w grupie kontrolnej. Szczepionka firmy Pfizer była najczęściej wybieraną szczepionką, podczas gdy szczepionka firmy Johnson & Johnson była najrzadziej wybierana zarówno w grupie badanej, jak i kontrolnej.

Ból w miejscu wstrzyknięcia był najczęstszym objawem zgłaszanym po otrzymaniu szczepionki w grupie badanej (>50%). Ten sam objaw wystąpił u prawie ¾ respondentek w grupie kontrolnej. U ⅓ kobiet w ciąży nie wystąpiły żadne objawy wywołane szczepionką. To samo zgłosiło tylko 18% kobiet z grupy kontrolnej.

Obie grupy zostały zapytane o ich opinie na temat szczepienia kobiet w ciąży. Według 25% kobiet z grupy badanej i 42% kobiet z grupy kontrolnej szczepienie było bezpieczne i konieczne, podczas gdy 10% kobiet w ciąży i 8% kobiet w wieku rozrodczym uważało, że szczepionka jest niebezpieczna. Pogląd, że szczepienie jest przeciwwskazane w ciąży podzielał podobny odsetek respondentów w grupie badanej i kontrolnej, odpowiednio 5% i 7%.

Respondentkom zadano pytanie *„Jakie są według Ciebie skutki szczepienia przeciwko COVID-19?”*. Mniej niż połowa z grupy badanej i kontrolnej wybrała odpowiedź *„nabycie swoistej odporności na COVID-19 zarówno przez matkę, jak i dziecko”*, podczas gdy ⅕ kobiet w ciąży uważała, że szczepionka powoduje wady u płodu. Pogląd ten podzielało tylko 12% kobiet w grupie kontrolnej. Odpowiedź *„nabycie swoistej odporności na COVID-19 przez dziecko”* była najrzadziej wskazywana (tylko 3% w obu grupach).

W grupie kobiet w ciąży mniej niż 12% zaszczepionych kobiet zachorowało na COVID-19. Spośród zaszczepionych kobiet w ciąży 88% uniknęło COVID-19. Nie stwierdzono istotnych statystycznie różnic między zasięgiem szczepień, a zachorowalnością na COVID-19 w grupie kontrolnej.

Poziom lęku przed koronawirusem SARS-CoV-2 różnił się w zależności od użytego narzędzia badawczego. Wykazano istotne statystycznie różnice między grupami dla CAS (p = 0,025), DrVac-COVID19S (p = 0,00) lub VAC-COVID-19 (p = 0,00). Kobiety w ciąży uzyskały istotnie niższe wyniki. Nie stwierdzono istotnych statystycznie różnic w przypadku FCV-19S. Ponadto, zarówno kobiety w ciąży, jak i kobiety z grupy kontrolnej wykazywały pozytywne nastawienie do szczepienia przeciwko COVID-19. Średni wynik VAC-COVID-19 wyniósł 44,26 pkt w grupie kontrolnej i 41,44 pkt w grupie badanej. Wyniki te odpowiadają wynikom uzyskanym w skali DrVac-COVID19S – średni wynik wyniósł 51,25 pkt dla kobiet w ciąży i 55,85 pkt dla kobiet w wieku rozrodczym, co również wskazuje na wysoki poziom akceptacji szczepionki i pozytywne nastawienie do niej. Średni wynik CAS wyniósł 0,61 pkt w grupie ciężarnych i 1,03 pkt w grupie kontrolnej, co sugeruje niski poziom lęku związanego z COVID-19. Inne wyniki dotyczące nasilenia lęku i strachu przed koronawirusem SARS-CoV-2 uzyskano przy użyciu FCV-19S. Średni wynik oscylował wokół 15 pkt z możliwych 35 pkt, wskazując na umiarkowany lęk.

Badania wykazały, że strach przed koronawirusem SARS-CoV-2 wzrastał wraz z wydłużaniem się ciąży. Kobiety w ciąży w pierwszym trymestrze miały niższe (12,34) wyniki FCV-19S niż kobiety w ciąży w drugim (14,70) i trzecim trymestrze (15,16). W pozostałych skalach nie wykazano istotnych różnic w wynikach w zależności od trymestru ciąży. Poziom lęku w grupie kobiet w ciąży można określić jako umiarkowany i wzrastający wraz ze zbliżaniem się porodu.

Najsilniejszą korelację stwierdzono między VAC-COVID-19 i DrVac-COVID-19S. Współczynnik Spearmana wynosił 0,722 dla grupy kontrolnej i 0,753 dla grupy badanej, co wskazuje na silną dodatnią zależność. Występowała również dodatnia korelacja między CAS i FCV-19S, ale była ona mniej istotna. Współczynnik Spearmana wynosił 0,377 dla grupy kontrolnej i 0,364 dla grupy badanej. W pozostałych skalach korelacje były statystycznie istotne, ale ze względu na małą liczbę respondentów w grupach, wyników nie można prognozować na całą populację.

8. WNIOSKI

Wniosek ogólny

Kobiety ciężarne wykazywały lęk przed COVID-19 w umiarkowanym stopniu, jednak wyniki różniły się w zależności od zastosowanego narzędzia badawczego.

Wnioski szczegółowe

1. Wyniki VAC-COVID-19 i DrVac-COVID19S potwierdziły wysoki poziom akceptacji szczepionki wśród ankietowanych kobiet i pozytywne nastawienie do niej.
2. Wykazano istotny statystycznie związek między poziomem wykształcenia, hospitalizacją podczas ciąży oraz liczbą ciąż, a poczuciem lęku przed COVID-19.
3. Niewystarczająca wiedza na temat skutków lub powikłań szczepionki u płodu była najczęstszą przyczyną odmowy szczepienia przeciwko COVID-19 wśród kobiet w ciąży. Dostępność dokładnych informacji może pozytywnie wpłynąć na wskaźniki szczepień w tej populacji.
4. Wskazane jest opracowanie nowych projektów szkoleniowych dla pracowników systemu ochrony zdrowia, w szczególności w zakresie opieki okołoporodowej, w celu lepszego identyfikowania i uwzględniania stresorów COVID-19 oraz zapewnienia najlepszego wsparcia psychologicznego w oparciu o potrzeby i wymagania związane z tym wyzwaniem, a także zastosowania systemu zachęt do szczepień przeciwko COVID-19, uwzględniającego korzyści zarówno dla przyszłych matek, jak i ich nienarodzonych dzieci. Ponadto, temat ten powinien zostać zbadany bardziej szczegółowo poprzez przeprowadzenie badań longitudinalnych.

9. KOPIE PUBLIKACJI WCHODZĄCYCH W SKŁAD ROZPRAWY DOKTORSKIEJ

9.1. ARTYKUŁ NR 1

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Article

An Assessment of the Level of COVID-19 Anxiety among Pregnant Women in Poland: A Cross-Sectional Study

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Abstract: Introduction: The COVID-19 pandemic has caused general anxiety worldwide. Pregnant women are at a much higher risk of developing the infection due to multiple changes that occur in the body during this period. The consequences of the disease can be dramatic not only for the expectant mothers, but also for their unborn children. SARS-CoV-2 infection is generally known to cause serious concerns about future health and life. The data on the severity of COVID-19 pandemic-related anxiety in pregnant women are insufficient. The aim of the study was to assess the level of COVID-19-related anxiety among pregnant women in Poland. Materials and Methods: The study included 173 pregnant women who volunteered for the research. The research was conducted by means of an online diagnostic survey containing an original questionnaire and the following standardized tools: State-Trait Anxiety Inventory (STAI), Short Health Anxiety Inventory (SHAI), and General Anxiety Disorder-7 (GAD-7). Results: Women hospitalised during pregnancy differed statistically significantly in terms of STAI-X1 scores. Primiparas obtained statistically significantly higher SHAI scores than multiparas. Women with higher education had higher SHAI scores. In the GAD-7 scale, 13.3% of respondents obtained a score suggesting a suspected generalised anxiety disorder. Conclusions: Pregnant women are concerned about both developing COVID-19 and the consequences of infection for themselves and their unborn children. The study demonstrated anxiety of varying severity (depending on the tool used). Hospital stay during pregnancy is an additional stressor in expectant women. Further studies are needed to assess the level of COVID-19-related anxiety to assess this phenomenon in Poland in more detail.

Keywords: anxiety; COVID-19; fear; general anxiety disorder-7 (GAD-7); pregnant; SARS-CoV-2; short health anxiety inventory (SHAI); state-trait anxiety inventory (STAI)

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1. Introduction

The current COVID-19 pandemic is considered to be an example of a natural disaster with such a heavy global health burden, from which more than 236 million people worldwide are suffering and almost 5 million people have died [1]. Poland ranks 16th among the countries with the highest number of coronavirus cases in the world, with 2,918,863 people infected and 75,834 deaths [2].

The COVID-19 pandemic has caused panic and mental health problems around the world [3]. Frequent preventive measures (e.g., washing hands, masking, social distancing, and isolation) during a pandemic obsess people, which increases the risk of psychological damage [4]. Moreover, the pandemic has caused changes in everyday life, which has increased the risk of anxiety and depression [5].

Pregnant women are more vulnerable to any effects of the COVID-19 crisis, which requires action to protect this population [6]. During a pandemic, pregnant women have

limited access to primary health care services [7]. Additional factors affecting their mental health are concerns about exposure to COVID-19 and concerns about COVID-19 vaccinations [8]. The prevalence of mental disorders in pregnant women was much higher during the COVID-19 pandemic than in the pre-pandemic period [9,10]. Fear of COVID-19, anxiety, and depression were the most common mental disorders among pregnant women [11,12]. Such disorders were associated with adverse effects of pregnancy, such as preterm labor, low for gestational age, and low birth weight of the newborn [13,14].

While COVID-19 is well-known to cause considerable fear among the general population, there is a little data on the perceived anxiety related to the ongoing COVID-19 pandemic in Poland, particularly among pregnant women. Therefore, the aim of the study was to analyse and assess the symptoms of COVID-19-related anxiety among pregnant women; in particular, to evaluate trait and state anxiety along with health anxiety and generalized anxiety disorder. Additionally, we assessed the impact of selected variables on the severity of anxiety symptoms in the study group. We assumed that the severity of anxiety disorders among pregnant women in Poland would be moderate.

2. Materials and Methods

2.1. Study Design and Data Collection

The study was conducted from 5 April 2021 to 26 July 2021. The study group included volunteers. Women at various stages of pregnancy were included in the study. We placed a link to the questionnaire, created with the use of a dedicated software (Webankieta) (Get Feedback, Warsaw, Poland) on social media. There were six discussion groups for pregnant women, which gathered 373 women in total. The respondents' responses were recorded on the platform used and then downloaded as raw data for statistical analysis. The mean time to complete the questionnaire was 23 min.

In addition to female gender and pregnancy, written informed consent was an additional inclusion criterion. Participation in the anonymous study was voluntary. Each participant could withdraw from the study at any time.

There were 589 views on the platform. Considering the number of views, the level of completing the entire questionnaire was 29.33%. A total of 19 questionnaires were not fully completed.

2.2. Measures

We used our own questionnaire dedicated for this study. It contained sociodemographic questions and a set of 24 closed questions on the stressors associated with the current epidemiological situation due to SARS-CoV-2 coronavirus infections. Furthermore, we used the following standardised tools: General Anxiety Disorder-7 (GAD-7), Short Health Anxiety Inventory (SHAI), and State-Trait Anxiety Inventory (STAI).

2.2.1. State-Trait Anxiety Inventory (STAI)

The STAI scale is built of two independent subsections. Each part includes 20 items. The first part, STAI X-1, evaluates anxiety as an emotional state at the moment. The second part, STAI X-2, assesses anxiety as a personality trait [15]. The respondent chooses one of the 4 statements for each item. The sum of all the answers for each individuals determines the overall level of anxiety. The score for each subsection is between 20 and 80 points. The higher the total score, the higher the level of anxiety experienced. Suspicion of an anxiety disorders occurs when the sum of the points is 39–40 [16,17].

2.2.2. Short Health Anxiety Inventory (SHAI)

The Short Health Anxiety Inventory (SHAI) is a scale that consists of 18 items and is used to assess anxiety in two aspects: probability of the disease and the negative effects of the disease. Each of the 18 statements contains four options. Respondents choose the one that best describes their emotions over the past 6 months.

The responses are rated on a 4-point Likert scale, where: 0 indicates lack of symptoms, 1—mild symptoms, 2—severe symptoms, and 3—very severe symptoms. The cut-off point for detecting health anxiety is 20 points [18,19].

2.2.3. Generalised Anxiety Disorder Assessment (GAD-7)

The GAD-7 is a seven-point scale that is used to assess the level of anxiety and to assess the risk of developing generalized anxiety disorder (GAD). The questions included in the questionnaire concern the subjective assessment of anxiety, tension, nervousness, the ability to control emotions, the ease of their manifestation, and problems with relaxation The responses are rated on a 3-point Likert scale, where: 0 indicates not at all, 1—several days, 2—more than half the days, and 3—nearly every day. The assessment is based on the past 2 weeks. Scores 5, 10, and 15 are mild, moderate, and severe, respectively. Generalized anxiety disorder is likely if the sum of the points is at least 10 [20].

2.3. Procedure and Ethical Considerations

The study was conducted in accordance with the recommendations, and was reviewed and approved by the Ethics Committee of the Medical University of Bialystok (No. APK.002.248.2021). All participants gave a written informed consent in accordance with the Declaration of Helsinki.

2.4. Statistical Analysis

Statistica 13.3 (StatSoft Company, Hamburg, Germany) was used for statistical analysis. The analysed variables were of dichotomous, interval, or ordinal nature. The chi-square test was used for dichotomous variables, and basic descriptive statistics for interval results. We used the Mann–Whitney U test to determine statistical significance. The level of statistical significance was set at $p < 0.05$ for each test.

3. Results

A total of 173 women participated in the study, which accounted for 49% of women who completed the questionnaire. Detailed sociodemographic characteristics of study participants are presented in Table 1.

The respondents were asked if they were concerned about contracting COVID-19 during pregnancy. It was found that infection with COVID-19 during pregnancy had a significant impact on the answer to this question. Fear of contracting COVID-19 was reported by 30.77% of women with a history of infection and over 50% of women in the group with no such history.

Table 2 summarizes the descriptive statistics of the standardised tools used in the study. A detailed analysis of GAD-7 results showed that the total score indicated anxiety symptoms of varying severity in 71% of respondents. A total of 23 (13.3%) respondents scored at least 10 points, which suggests a suspected generalised anxiety disorder. The mean score obtained by respondents was 13.29 for the SHAI scale. In the GAD-7 scale, most respondents scored between 5 and 9 points. The mean scores obtained in STAI-XI and STAI-X2 were similar, i.e., 42.26 and 40.24, respectively. Details are shown in Table 2.

Table 1. Sociodemographic characteristics of respondents.

Sociodemographic Feature		*n*	%
Age (years)	<25	15	8.67%
	25–34	132	76.30%
	≥35	26	15.03%
Education	middle school	1	0.58%
	basic vocational	13	7.51%
	secondary	46	26.59%
	higher	113	65.32%
Marital status	married	150	86.70%
	divorced	3	1.73%
	single	15	8.67%
	unmarried relationship	5	2.89%
Place of residence	urban	139	80.35%
	rural	34	19.65%
Socioeconomic status	very good	39	22.54%
	good	111	64.16%
	moderate	23	13.30%
	poor	0	0.00%
Number of children	0	83	47.98%
	1	65	37.57%
	2	17	9.83%
	3	6	3.47%
	4	1	0.58%
	5	1	0.58%
Parity	primipara	83	47.98%
	multipara	90	52.02%
Trimester	I (1–13 weeks)	16	9.25%
	II (14–26 weeks)	25	14.45%
	III (27–40 weeks)	132	76.30%
History of mental disorders	yes	9	5.20%
	no	164	94.80%
History of psychotropic therapy	yes	10	5.78%
	no	163	94.22%
History of the prevalence of COVID-19	yes	26	15.03%
	no	147	84.97%

Table 2. Summary of descriptive statistics of the standardised research tools.

	M	SD	Q_1	Me	Q_3	Min.	Max.
SHAI	13.29	6.17	9	13	17	2	40
GAD-7	5.79	3.90	3	5	7	0	21
STAI-X1	42.26	11.20	34	41	50	22	74
STAI-X2	40.25	8.50	34	40	45	23	69

Abbreviations: GAD-7—General Anxiety Disorder-7, M—mean, Max.—maximum, Me—median, Min.—minimum, SD—standard deviation, SHAI—Short Health Anxiety Inventory, STAI—State-Trait Anxiety Inventory, Q_1—lower quartile, and Q_3—upper quartile.

Primiparas were found to have statistically significantly ($p = 0.031$) higher SHAI scores (M = 14.45, Me = 14) compared to multiparas (M = 12.22, Me = 12). Primiparas were significantly younger. Both study groups were also compared for the following scales: GAD-7 and both STAI subscales. No statistically significant differences were found for these tools (Table 3).

Table 3. Comparison of primiparas and multiparas for SHAI, GAD-7, and STAI.

Tools	Primiparas (n = 83)					Multiparas (n = 90)					p
	M	SD	Q_1	Me	Q_3	M	SD	Q_1	Me	Q_3	
SHAI	14.45	6.81	10	14	18	12.22	5.35	9	12	16	0.031
GAD-7	6.45	4.27	4	6	8	5.19	3.43	3	5	7	0.066
STAI-X1	43.49	12.01	35	41	53	41.12	10.33	33	41	47	0.218
STAI-X2	40.35	8.24	34	41	46	40.16	8.78	34	40	44	0.753

Abbreviations: GAD-7—General Anxiety Disorder-7, M—mean, Me—median, p—p-value, SD—standard deviation, SHAI—Short Health Anxiety Inventory, STAI—State-Trait Anxiety Inventory, Q_1—lower quartile, and Q_3—upper quartile.

The analysis has shown that women with higher education scored statistically significantly higher in SHAI (p = 0.019, M = 14.17, Me = 13) and GAD-7 (p = 0.006, M = 6.31, Me = 6). No statistically significant results were found for the other scales (Table 4).

Table 4. Comparison of women with and without higher education for the following tools: SHAI, GAD-7, and STAI.

Tools	Higher Education (n = 113)					No Higher Education (n = 60)					p
	M	SD	Q_1	Me	Q_3	M	SD	Q_1	Me	Q_3	
SHAI	14.17	6.15	10	13	18	11.63	5.93	7.5	12	15.5	0.019 *
GAD-7	6.31	3.96	4	6	8	4.82	3.62	2	4	7	0.006 *
STAI-X1	41.87	11.19	34	40	48	43	11.27	37	41	52	0.369
STAI-X2	40.21	8.75	33	40	44	40.32	8.08	35.5	40	45.5	0.777

Abbreviations: GAD-7—General Anxiety Disorder-7, M—mean, Me—median, p—p-value, SD—standard deviation, SHAI—Short Health Anxiety Inventory, STAI—State-Trait Anxiety Inventory, Q_1—lower quartile, Q_3—upper quartile, and *—statistically significant.

Hospitalised pregnant women scored significantly higher in STAI-X1. No statistically significant differences were found between pregnant women hospitalised during pregnancy and those not requiring hospitalisation in the remaining scales (Table 5).

Table 5. The impact of hospital stays during pregnancy on the rating of anxiety.

Tools	Hospitalised during Pregnancy (n = 93)					Not Hospitalised during Pregnancy (n = 80)					p
	M	SD	Q_1	Me	Q_3	M	SD	Q_1	Me	Q_3	
SHAI	12.77	5.52	10	12	15	13.88	6.84	8.5	13.5	18	0.215
GAD-7	5.76	3.91	3	6	7	5.82	3.90	3	5	7	0.951
STAI-X1	44.14	11.55	37	41	52	40.07	10.42	32	39	46.5	0.019 *
STAI-X2	39.55	8.02	34	40	44	41.06	9.01	34.5	40	45	0.459

Abbreviations: GAD-7—General Anxiety Disorder-7, M—mean, Me—median, p—p-value, SD—standard deviation, SHAI—Short Health Anxiety Inventory, STAI—State-Trait Anxiety Inventory, Q_1—lower quartile, Q_3—upper quartile, and *—statistically significant.

4. Discussion

So far, it has been established that the outbreak of the pandemic increased the level of mental health disorders in the general population [21,22], and it is more visible in women than in men. Some studies report that during catastrophes or major events, pregnant women are more likely to develop mental health problems than in the general population [23,24]. A recent systematic review and meta-analysis [25] assessing the impact of the pandemic on the mental health of pregnant women has shown that the level of mental health disorders in pregnant women is 37%. Our study showed that women who had

COVID-19 had lower levels of fear of infection with the SARS-CoV-2 than pregnant women who had not contracted the disease so far. Different results were obtained in another Polish study by Nowak et al. [26]. The authors proved that pregnant women who had been infected with SARS-CoV-2 experienced a higher level of anxiety than those who had not been infected so far.

Our study showed moderate anxiety among pregnant women in the STAI scale. Another study among pregnant women also assessed the level of antenatal anxiety using the STAI scale. Similar findings were obtained in both studies [27]. Similar results in the same scale were also shown in a study in Italy [28]. These findings confirm the conclusions obtained by Sinjari et al. [29], that questionnaires could be useful tools to assess patients' conditions before the visit to a doctor.

Considering the parity of respondents, we found that primiparas show higher COVID-19-related anxiety than multiparous women, as confirmed by SHAI scores. STAI results reported by Italian researchers also confirmed our hypothesis [28]. Such findings may be due to both the new life situation and the lack of knowledge about pregnancy and coronavirus infection during this special time.

The data on the impact of gestational age on the level of COVID-19-related anxiety among pregnant women are contradictory. In our analysis, we compared the scores obtained in the standardized scales depending on the trimester of pregnancy, but no statistically significant differences were found. Other authors reported higher STAI scores in the first and third trimesters than those obtained in our study [30]. Schubert et al. showed that, on the other hand, STAI scores remained stable throughout pregnancy [31].

We measured the prevalence of anxiety symptoms using the GAD-7 scale. It was found to be high, i.e., 62.5% among pregnant women, including 49% with mild, 10% with moderately severe, and 3.5% with severe anxiety due to COVID-19. Other studies have also shown that pregnant women are much more prone to stress during the COVID-19 pandemic [32].

Our analysis showed that pregnant women with higher education were significantly older and scored statistically significantly higher in both SHAI and GAD-7. Similar findings on the impact of higher education on the increased levels of anxiety have been reported by other authors [32]. It can be assumed that greater awareness of one's own health negatively affects its loss as a result of a serious illness. The differences in the obtained results can be due to the dynamic nature of the disease and the fact that it is perceived differently around the world.

In this study, the median STAI score for anxiety was 41. A total of 57.23% of the pregnant women scored $\geq$40. In a similar study involving pregnant women, the median score in the same scale was 37, including a score of $\geq$40 in 38.2% of participants [33]. Another study among pregnant women showed that the overall prevalence of anxiety symptoms measured with STAI (STAI > 40) was 62.6% [34]. An Italian study found similar levels of COVID-19-related anxiety in pregnant women (68%) [30]. Turkish studies also reported STAI scores above the cut-off for clinically significant symptoms of anxiety [35]. Similar findings in all the above-mentioned studies may be due to the different state of the women (pregnancy) and their concern about the health of their unborn children.

The presented results confirm COVID-19-related anxiety among pregnant women. Its level varies and is related to sociodemographic factors. Due to the negative effects of anxiety and stress on pregnant women and their unborn children, further research is needed on anxiety caused by the COVID-19 pandemic to prevent negative effects and improve the health of the population. Mental health screening for pregnant women should be included in the mandatory prenatal screening to reduce any potential anxiety symptoms.

Limitations of the Study

The study has certain limitations. The presented results come from an analysis based on a subjective assessment of anxiety symptoms in pregnant women. Although we used scales that are considered sensitive research tools, they are based on subjective feelings

and do not include objective criteria of clinical symptoms, which may lead to false-positive results. The number of pregnant women participating in the study is another limitation. The small sample size does not allow for extrapolation of results to the general population of pregnant women in Poland. However, despite these limitations, our findings can be a reference point for further studies assessing the level of COVID-19-related anxiety among pregnant women both in Poland and in the world.

5. Conclusions

In conclusions, primiparas showed statistically significantly higher anxiety levels than multiparas. Higher education also contributed to higher scores. Hospital stays during pregnancy contributed to statistically higher STAI-X1 scores. There was no statistically significant relationship between pregnancy trimester and the prevalence of COVID-19. There is a need to continue research on COVID-19-related anxiety among pregnant women in Poland to assess this phenomenon and the causative factors in more detail.

The COVID-19 pandemic has serious consequences. Therefore, in the periods of health crisis, it is imperative to develop research focused on studying the phenomenon and its impact with other variables in order to understand its impact on pregnant women. This can help prevent and address negative mental health effects that can affect the functional status and quality of life of pregnant women.

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Institutional Review Board Statement: The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by the Ethics Committee of the Medical University of Białystok, Poland (No. APK.002.248.2021).

Informed Consent Statement: Informed consent was obtained from all the subjects involved in the study.

Data Availability Statement: Data are available upon reasonable request.

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9.2. ARTYKUŁ NR 2

vaccines

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Article

Fear of COVID-19 and Vaccine Hesitancy among Pregnant Women in Poland: A Cross-Sectional Study

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Abstract: Introduction: Pregnant women are particularly vulnerable to anxiety and stress, and the COVID-19 pandemic has definitely contributed to anxiety in this group. Researchers continue their work on COVID-19 vaccine formulations to reduce the spread of the SARS-CoV-2 virus and minimise the impact of the pandemic. Despite the increased prevalence and severity of anxiety among pregnant women during the COVID-19 pandemic, their attitudes towards COVID-19 vaccine vary. The aim of this study was to assess the levels of anxiety experienced by pregnant women due to COVID-19 and their attitudes to vaccination. Materials and methods: A total of 595 women voluntarily participated in the study. The respondents were divided into two groups: the study group (n = 288), which consisted of women who were pregnant at the time of the survey, and the control group (n = 307), which included women of reproductive age (18–49 years). The study used a diagnostic survey method with a web-based questionnaire consisting of the author's survey questionnaire and the following standardised tools: the Scale to Measure the Perception of SARS-CoV-2 Vaccines Acceptance (VAC-COVID-19 SCALE), the Fear of COVID-19 Scale (FCV-19S), the Drivers of COVID-19 Vaccination Acceptance Scale (DrVac-COVID19S) and the Coronavirus Anxiety Scale (CAS). Results: The level of COVID-related anxiety differed depending on the tool used. Mild anxiety was reported for CAS, while FCV-19S showed its moderate levels. Both pregnant women and women of reproductive age showed high scores in VAC-COVID-19 and DrVac-COVID19S. The mean VAC-COVID-19 scores were 41.44 in the study group and 44.26 in the control group, and the mean DrVac-COVID19S scores were 51.25 in pregnant women and 55.85 in women of reproductive age. This indicates a high level of acceptance of and positive attitudes toward vaccinations. Conclusions: Pregnant women showed moderate coronavirus anxiety. Women in both the study group and the control group showed mostly positive attitudes towards COVID-19 vaccination.

Keywords: anxiety; attitudes; COVID-19; fear; pregnant; SARS-CoV-2; vaccines

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1. Introduction

COVID-19 infection, responsible for severe acute respiratory distress syndrome, was declared a global pandemic by the World Health Organisation (WHO) in March 2020 [1]. The pandemic has caused serious conditions and death among millions of people worldwide [1,2]. Various COVID-19 vaccination studies have shown over 90% efficacy in preventing severe COVID-19 disease and mortality [3–5]. Worldwide, more than 63% of the population is fully vaccinated, and extensive vaccination programmes are underway. As of 4 March 2020, 6,213,262 cases of COVID-19 were reported in Poland, of which 5,335,955 recovered and 117,252 were fatal [6]. By 12 September 2022, 56,332,553 vaccinations had been administered in Poland. The number of fully vaccinated people is estimated at 22,551,992 [7].

Pregnancy is a special period in a woman's life with increased levels of anxiety, stress and concern about their unborn child's and their own health. Additional negative factors include a relevant obstetric history, previous miscarriages or perinatal complications [8]. Mental health is an important factor influencing maternal wellbeing and foetal development [9].

Approximately 15% of all pregnant women experience emotional changes that increase the risk of anxiety and depression, which can in turn adversely affect their health and their developing foetuses [10]. Children of mothers who exhibit high levels of anxiety and stress during pregnancy may experience emotional, behavioural and cognitive problems and are at higher risk of neurodevelopmental disorders [11]. There are literature reports indicating a significantly higher prevalence of anxiety and depressive symptoms in pregnant women during the COVID-19 pandemic than before the pandemic [12,13]; however, their exact prevalence is currently unknown [14]. However, studies to date on fear of COVID-19 have shown that women were more frightened and concerned about COVID-19 than men [15,16]. Fears of health consequences had a particularly negative impact on their mental status [17]. Additionally, the age under 45 has proved to be a significant risk factor for impairment of both cognitive functions and mental health [15,18].

Despite the higher prevalence and severity of anxiety among pregnant women during the COVID-19 pandemic, their attitudes towards COVID-19 vaccination vary. Almost half of the women surveyed said they would vaccinate if it were recommended for pregnant women. An equally large number of pregnant women refused to take the vaccine. Insufficient data on the safety of the COVID-19 vaccine in pregnancy and reports on possible foetal toxicity are the most common reasons for refusal [19]. However, data collected in the scientific literature suggest that the benefits of COVID-19 vaccination outweigh any known or potential risks during pregnancy [20]. According to the Centers for Disease Control and Prevention (CDC), there is no evidence to suggest that vaccination may cause harm during pregnancy or that there are any safety concerns regarding pregnancy or the impact on the newborn child [20–22]. The WHO approved COVID-19 vaccine for pregnant women soon after its introduction. Despite the widespread availability of COVID-19 vaccine, limited global data are available on pregnant women's knowledge, attitudes and practices related to the vaccine [23], as few population-based prospective studies on COVID-19 vaccine have been conducted among pregnant women to date.

By definition, COVID-19 causes significant fear and anxiety among the population. From our observation, there are insufficient data on the severity of anxiety resulting from the COVID-19 pandemic among pregnant women in Poland. Little is known about the fear of COVID-19 or its effect on maternal psychological distress or birth outcomes. This is an important gap because it limits the ability of healthcare providers and health systems to anticipate and rapidly respond to the needs of pregnant individuals when epidemic and pandemic infectious diseases arise. There are also insufficient data on opinions regarding COVID-19 vaccination among pregnant women. Despite the importance of vaccination to COVID-19 prevention and management as well as the low rate of vaccination among pregnant women in the world, there are limited data about pregnant women's acceptance of COVID-19 vaccine. Consequently, the present study was conducted to narrow this gap. Therefore, the aim of this study was to analyse and assess the prevalence of COVID-19 anxiety symptoms and to investigate the attitudes towards COVID-19 vaccination among pregnant women. We assumed that the severity of anxiety disorder symptoms among pregnant women in Poland would oscillate at a moderate level, while their attitudes towards vaccination would vary, with a similar proportion of supporters and opponents. In addition, the analysis of pregnant women's attitudes towards vaccination may be useful for health education of patients and help prevent COVID-19 during pregnancy.

2. Materials and Methods

2.1. Participants

A minimum sample size of at least 384 enrolled individuals would have been required to investigate the selected variables in pregnant women in Poland (i.e., 211,022 pregnant women in Poland in 2021). The sample was calculated by a sample size calculator, based on the reference population, assuming a response proportion of 50%, a 95% confidence level, and a 5% margin of error.

Finally, the study included 288 women at different stages of pregnancy as the study group and 307 women of reproductive age as the control group. A total of 595 women participated in the study. The sample was not representative, because the number of births in Poland has been constantly decreasing in recent years.

2.1.1. Study Group

The age of respondents ranged from 19 to 42 years. Most of them were married (82%). Almost 47% had a university education. Less than 39% declared rural areas as their place of residence, with the remaining women residing in cities throughout Poland. Over 62% of respondents described their socioeconomic status as "good".

2.1.2. Control Group

The age criterion ranged from 18 to 49 years. The mean age in the group was 31 years. The majority of respondents were married (50%). Almost 51% had a university education. Less than 29% of the respondents declared rural areas as their place of residence; the remaining women were city dwellers from all over Poland. A total of 62% of respondents described their socioeconomic status as "good".

Detailed socio-demographic characteristics are shown in Table 1.

Table 1. Socio-demographic characteristics of respondents.

Socio-Demographic Characteristics		Study Group		Control Group	
		n	**%**	***n***	**%**
Education	primary	1	0%	5	2%
	middle school	9	3%	5	2%
	basic vocational	18	6%	25	8%
	secondary	126	44%	116	38%
	higher	134	47%	156	51%
Marital status	married	235	82%	153	50%
	divorced	9	3%	15	5%
	single	37	13%	113	37%
	in an informal relationship	7	2%	23	8%
Place of residence	urban	177	61%	218	71%
	rural	111	39%	89	29%
Socioeconomic status	very good	47	16%	59	19%
	good	179	62%	189	61%
	average	62	22%	59	19%
Number of children	0	139	48%	151	49
	1	88	30.5%	48	16
	2	33	11.5%	77	25
	3	23	8%	23	7.5
	4	4	1.3%	7	2.3
	5	1	0.3%	0	0
	8	0	0%	1	0.3

2.2. Study Design and Data Collection

An original author's questionnaire, designed for the purpose of the present study, was used. It included questions on socio-demographic characteristics and detailed questions on past COVID-19 infection, vaccination and opinion on COVID-19 vaccine. In addition to questions on socio-demographic characteristics, the questionnaire contained eight closed-ended questions, four single-choice and four multiple-choice questions. Standardised survey instruments, which are discussed below, were also used.

The survey was conducted between 5 February 2022 and 20 April 2022. A link to the dedicated questionnaire on the Webankieta platform was posted on social media in discussion groups dedicated to pregnant women (study group) and discussion groups aimed at young mothers and women of reproductive age (control group). Interested women were able to voluntarily participate in the online survey. The responses were recorded on the platform, then downloaded as raw data and statistically analysed using dedicated specialised software.

Participation in the anonymous study was voluntary and tantamount to consenting to the use of the acquired data for scientific purposes. Ongoing pregnancy was the only criterion for inclusion in the study group. Each participant could withdraw from the study at any time. Age between 18 and 49 years was the criterion for inclusion in the control group.

There were 1044 visits on the platform, which yielded 57% of fully completed questionnaires. There were 113 incomplete questionnaires.

2.3. Measures

The following standardised psychometric scales were used in the study: The Fear of COVID-19 Scale (FCV-19S), Coronavirus Anxiety Scale (CAS), The Drivers of COVID-19 Vaccination Acceptance Scale (DrVac-COVID19S) and the Scale to Measure the Perception of SARS-CoV-2 Vaccines Acceptance (The VAC-COVID-19 Scale).

The Fear of COVID-19 Scale (FCV-19S) was developed to measure anxiety and fear of COVID-19. FCV-19S is a simple seven-item self-administered scale developed by Ahorsu et al. [24]. Answers included "strongly disagree," "disagree," "neither agree nor disagree," "agree", and "strongly agree". The minimum score possible for each question is 1 (strongly disagree), and the maximum is 5 (strongly agree). The total score is calculated by adding up each item score (ranging from 7 to 35). The higher the score, the greater the fear of COVID-19 [25]. FCV-19S has been translated and validated in a number of countries, including Poland. This tool obtained high reliabilities in the Polish validation study, with Cronbach's α of 0.85–0.89 [26].

The Coronavirus Anxiety Scale (CAS) is a brief self-reported mental health screener of dysfunctional anxiety associated with the coronavirus crisis, which consists of five items related to a variety of physical and mental ailments that appear in response to news or thoughts about the coronavirus. Each item contains answers from 0 ("not at all") to 4 ("nearly every day over the last 2 weeks") [27]. Cronbach's α and McDonald's ω coefficients for the Polish version of CAS were $\alpha = 0.93$ and $\omega = 0.93$, respectively [28].

The VAC-COVID-19 scale is a valid and reliable instrument of public health to measure perceptions of SARS-CoV-2 vaccine acceptance. This scale can be very useful to determine the reasons why different populations adhere or not to the vaccination, in order to help propose adequate and effective strategies to advance vaccination coverage rates. The VAC-COVID-19 scale is a simple eleven-item self-administered scale developed by Mejia et al. [29]. There are two groups of factors: positive (reasons for receiving vaccination) and negative (reasons for not receiving vaccination). Each item had five possible Likert-type responses: strongly disagree, disagree, neither disagree nor agree, agree, and strongly agree. The minimum score possible for each question is 1 (strongly disagree), and the maximum is 5 (strongly agree). The reverse scoring applies to the second (negative) group of factors. The total score is calculated by adding up each item score (ranging from 11 to 55). The

higher the score, the more positive attitudes towards COVID-19 vaccinations. Cronbach's α coefficient for this tool was $\alpha = 0.831$ [29].

The DrVac-COVID19S was adapted from the MoVac-Flu Scale [30]. The major difference between the DrVac-COVID19S and the MoVac-Flu Scale is that the MoVac-Flu Scale uses the word flu, and the DrVac-COVID19S uses the word COVID-19. The DrVac-COVID19S contains 12 items, where nine items are positively worded (items 1 to 6, 8, 9, and 12) and three items are negatively worded (items 7, 10, and 11). Therefore, the DrVac-COVID19S shares the same model of CME as the MoVac-Flu Scale in assessing an individual's values, impacts, knowledge, and autonomy traits. The four traits can help healthcare providers and researchers to understand how an individual cares about the purpose of COVID-19 vaccination uptake (values); believes in the effects of COVID-19 vaccination uptake in preventing COVID-19 infection (impacts); has knowledge regarding the COVID-19 vaccination uptake (knowledge); and is confident and has control in obtaining COVID-19 vaccination if the individual wants to (autonomy). Moreover, the 12 items comprise four traits corresponding to the CME model: items 3 ("It is important that I get the COVID-19 jab"), 6 ("The COVID-19 jab plays an important role in protecting my life and that of others"), and 8 ("The contribution of the COVID-19 jab to my health and well-being is very important") comprise values; items 1 ("Vaccination is a very effective way to protect me against COVID-19"), 4 ("Vaccination greatly reduces my risk of catching COVID-19"), and 12 ("Getting the COVID-19 jab has a positive influence on my health") comprise impacts; items 2 ("I know very well how vaccination protects me from COVID-19"), 5 ("I understand how the flu jab helps my body fight the COVID-19 virus"), and 10 ("How the COVID-19 jab works to protect my health is a mystery to me") comprise knowledge; and items 7 ("I feel under pressure to get the COVID-19 jab"), 9 ("I can choose whether to get a COVID-19 jab or not"), and 11 ("I get the COVID-19 jab only because I am required to do so") comprise autonomy. All the items are rated using a seven-point Likert scale. After reverse coding, the negatively worded items (i.e., scoring for these items is from 1 (strongly agree) to 7 (strongly disagree)), a higher score in the DrVac-COVID19S indicates a higher level of COVID-19 vaccine acceptance. Cronbach's α in this scale was 0.86 [30].

2.4. Procedure and Ethical Considerations

The study was conducted in accordance with the recommendations of, and was reviewed and approved by, the Ethics Committee of the Medical University of Bialystok (No. APK.002.55.2022). All participants gave a written informed consent in accordance with the Declaration of Helsinki.

2.5. Statistical Analysis

Statistica 13.3 (StatSoft Polska, Krakow, Poland) was used for statistical analysis. The analysed variables were of nominal, interval, or ordinal nature. The chi-square test was used to assess relationships between nominal characteristics. For interval variables, Spearman's rank correlation coefficient was used. The Mann–Whitney U test was performed to compare two groups. Kruskal–Wallis test with post hoc tests were used for more than two groups. The level of statistical significance was set at $p < 0.05$ for each test.

3. Results

Table 2 shows the analysis of questions from the author's survey questionnaire. There was a significantly lower percentage of vaccinated women in the study group than in the control group. Additionally, the number of vaccinated and unvaccinated pregnant women was similar in the study group.

The analysis showed that the incidence rate of COVID-19 was significantly lower among pregnant women than in the control group. We did not investigate whether COVID-19 occurred before or after vaccination. Pfizer vaccine was the most common choice, while

the Johnson & Johnson vaccine was the least common choice in both the study group and control group.

Table 2. Analysis of the author's original questionnaire.

Question		Study Group		Control Group	
		n	%	*n*	%
Are you vaccinated against COVID-19?	yes	147	51	222	72
	no	141	49	85	28
Did you suffer from COVID-19?	yes	51	18	150	49
	no	237	82	157	51
What vaccine have you received?	Pfizer	97	66	167	75
	Moderna	21	14	25	11
	Astra-Zeneca	25	17	24	11
	Johnson & Johnson	10	7	18	8
Symptoms after vaccination	pain at the injection site	77	52	160	72
	swelling/local inflammation at injection site	10	7	26	12
	flu-like symptoms: fever, chills, muscle pain	48	33	104	47
	Runny nose, cough	6	4	21	9
	anaphylactic reaction	0	0	0	0
	no symptoms have occurred	49	33	41	18
What is your opinion on vaccinating pregnant women against COVID-19?	it is safe and necessary	72	25	128	42
	it is safe, but I don't want to be vaccinated	22	8	12	4
	vaccination will shorten the pandemic period	19	7	46	15
	it is dangerous	29	10	23	8
	it is contraindicated in pregnancy	14	5	20	7
	I have no opinion	142	49	115	38
What do you think are the effects of the COVID-19 vaccination?	acquisition of specific immunity against COVID-19 by both mother and child	127	44	154	50
	acquisition of specific immunity against COVID-19 by the mother	24	8	59	19
	acquisition of specific immunity against COVID-19 by the child	9	3	10	3
	preterm birth	28	10	17	6
	defects in the child	59	20	38	12
	perinatal complications (obstetric haemorrhage, etc.)	32	11	19	6
	infertility or problems getting pregnant in the future	48	17	31	10
	mutations or changes in the karyotype (genetic code) of the pregnant woman	17	6	25	8

Pain at the injection site was the most common symptom reported after receiving the vaccine in the study group (>50%). The same symptom occurred in almost 3/4 of respondents in the control group. No vaccine-induced symptoms occurred in 1/3 of the pregnant women. The same was reported by only 18% of the control group.

Both groups were asked about their opinions on vaccination of pregnant women. According to 25% of the study group and 42% of the control group, vaccination was safe and necessary, while 10% of pregnant women and 8% of women of reproductive age believed that the vaccine was dangerous. The opinion that vaccination is contraindicated in pregnancy was shared by a similar percentage of respondents in the study and control groups, i.e., 5% and 7%, respectively.

The respondents were asked the question "What do you think are the effects of COVID-19 vaccination?". Less than half of the study and control group chose the answer "acquisition of specific immunity against COVID-19 by both mother and child", whereas 1/5

of the pregnant women believed that the vaccine causes defects in the foetus. This opinion was shared by only 12% of women in the control group. The answer "acquisition of specific immunity against COVID-19 by the child" was least common (only 3% in both groups).

A summary of COVID-19 and vaccination rates among the respondents is shown in Table 3. In the group of pregnant women, less than 12% of vaccine recipients contracted COVID-19. Of the vaccinated pregnant women, 88% avoided COVID-19. No statistically significant differences were found between vaccine coverage and COVID-19 morbidity in the control group. We did not investigate whether the infection occurred before or after receiving the vaccine.

Table 3. Summary of COVID-19 rates and vaccine coverage.

Have You Had COVID-19?		Are You Vaccinated against COVID-19?			
		Study Group		Control Group	
		Yes	No	Yes	No
yes	*n*	18	33	109	41
	%	12	23	49	48
no	*n*	129	108	113	44
	%	88	77	51	52

Table 4 shows the descriptive statistics of the standardised scales used in the study. We found statistically significant differences between the groups for CAS (p = 0.025), DrVac-COVID19S (p = 0.00) or VAC-COVID-19 (p = 0.00). From the results, it can be seen that pregnant women scored significantly lower. No statistically significant differences were found in FCV-19S. Furthermore, both pregnant women and controls showed positive attitudes towards COVID-19 vaccination. The mean VAC-COVID-19 score was 44.26 in the control group and 41.44 in the study group. These results correspond with DrVac-COVID19S scores. Here, the mean score was 51.25 for pregnant women and 55.85 for women of reproductive age, which also indicates a high level of vaccine acceptance and positive attitudes towards it. The mean CAS score was 0.61 in the pregnant group and 1.03 in the control group, respectively, suggesting a low level of anxiety associated with COVID-19. Other results on the severity of anxiety and fear of coronavirus were obtained using the FCV-19S. The mean score oscillated around 15 out of a possible 35, indicating moderate anxiety.

Table 4. Descriptive statistics of standardised scales.

Scales	Control Group (n = 307)					Study Group (n = 288)					p
	M	Sd	Q_1	Me	Q_3	M	Sd	Q_1	Me	Q_3	
CAS	1.03	1.98	0	0	1	0.61	1.26	0	1.26	1	0.025
DrVac-COVID19S	55.85	14.41	45	57	68	51.25	13.97	43	49.5	62	0.000
FCV-19S	15.21	4.93	12	15	18	14.59	5.26	11	14	18	0.126
VAC-COVID-19	44.26	7.21	39	45	50	41.44	7.27	36	41	47	0.000

Abbreviations: CAS—Coronavirus Anxiety Scale, FCV-19S—The Fear of COVID-19 Scale, M—mean, Me—median, p—p-value, SD—standard deviation, Q_1—lower quartile, and Q_3—upper quartile.

Table 5 summarises scores obtained from pregnant women using the standardised tools by trimester of pregnancy. The analysis shows that the fear of coronavirus increased with increasing pregnancy time. Pregnant women in the first trimester had lower (12.34) FCV-19S scores than pregnant women in the second (14.70) and third trimester (15.16) of pregnancy. In the other scales, there were no significant differences in scores depending on the trimester of pregnancy. The level of anxiety in the group of pregnant women could be described as moderate and increasing with the approaching birth.

Table 5. Correlations between scores and pregnancy trimester.

Scales	Study Group-Pregnant Women								
	1st Trimester (n = 43)			2nd Trimester (n = 92)			3rd Trimester (n = 153)		
	M	Sd	Me	M	Sd	Me	M	Sd	Me
CAS	0.67	1.36	0	0.61	1.44	0	0.59	1.12	0
DrVac-COVID19S	53.86	13.67	51	51.25	13.21	49	50.52	14.50	49
FCV-19S	12.34	4.94	12	14.70	5.20	15	15.16	5.25	15
VAC-COVID-19 Scale	43.00	8.00	44	41.45	7.30	41	41.00	7.03	40

Abbreviations: CAS—Coronavirus Anxiety Scale, FCV-19S—The Fear of COVID-19 Scale, M—mean, Me—median, SD—standard deviation.

Table 6 shows the results of inter-scale correlation by groups. The strongest correlation was found between VAC-COVID-19 and DrVac-COVID-19S. The Spearman coefficient was 0.722 for the control group and 0.753 for the study group, indicating a strong positive relationship. There was also a positive correlation between CAS and FCV-19S, but less significant. The Spearman coefficient was 0.377 for the control group and 0.364 for the study group. In the remaining scales, the correlations were statistically significant, but due to the low number of respondents in the groups, the results cannot be projected to the entire population.

Table 6. Inter-scale correlations by groups.

		Spearman's r	
		Control Group (n = 307)	Study Group (n = 288)
CAS	DrVac-COVID19S	0.053	−0.005
	FCV-19S	0.377	0.364
DrVac-COVID19S	FCV-19S	0.207	0.196
VAC-COVID-19 Scale	CAS	0.108	0.020
	DrVac-COVID19S	0.722	0.753
	FCV-19S	0.178	0.082

Abbreviations: CAS—Coronavirus Anxiety Scale, FCV-19S—The Fear of COVID-19 Scale.

4. Discussion

In the general population, based on the study by Barchielli et al. [15], it was shown that the fear of the possible consequences of COVID-19 vaccinations was more often reported by older adults, while the fear of the disease, its consequences and the probability of isolation was most often reported by young adults compared to elderly people. This finding may be related to greater awareness of COVID-19 and preventive measures among older adults [31], which may explain less concern. At the same time, the importance of social ties among young people should also be taken into account, explaining why young adults experienced isolation with greater anxiety and negative effects on mental health [32,33]. In line with the results of previous studies [16,17], women reported greater fear of the disease and its consequences, but not in the older group. Again, this can be explained by less concern among the older adults, regardless of sex.

The presented paper is one of the few to investigate the level of COVID-19 pandemic-related anxiety among pregnant women and their attitudes towards COVID-19 vaccine using standardised, dedicated survey tools. The study found different levels of COVID-19 anxiety in pregnant women depending on the standardised scale used.

Several papers have documented that SARS-CoV-2 virus infection during pregnancy is closely associated with a severe course of the disease and many adverse obstetric complications [34–36].

Lin et al. conducted a study to assess COVID-19 anxiety using FCV-19S in 11 countries. Their results varied from country to country. Iranians showed the highest level of anxiety, with a mean score of 3.92. Respondents from New Zealand showed the lowest anxiety, with a mean score of 2.02 [37]. In our study, the mean anxiety scores obtained with the same standardised tool were 15.21 in the control group and 14.59 in the study group. Contrarily, anxiety levels in pregnant women with SARS-CoV-2 were low at the end of the pandemic in the UK, which was due to increased available clinical information and reassurance via social media, health-care professionals and primary care; however, the sample size in this study was too small to achieve a statistically valid result [38]. Another study assessed the impact of COVID-19-related anxiety and fear on perinatal depression among pregnant women in Italy. The mean FCV-19S and CAS scores were 15.0 and 1.7, respectively [39]. In our study, the scores of pregnant women were similar and were 14.6 in FCV-19S and 0.6 in CAS, respectively. Thus, it can be concluded that COVID-19-related anxiety levels among pregnant women are similar in many countries. Another Turkish study found that 27.6% of pregnant women described COVID-19 anxiety as "moderate". Furthermore, 52.6% of women expressed their willingness to receive COVID-19 vaccine when it was available [40]. During the COVID-19 pandemic, Berthelot et al. showed that pregnant women had higher levels of stress, anxiety and depression compared to pregnant women surveyed before the pandemic [41]. Durankus et al. showed that more than 1/3 of pregnant women experienced symptoms of depression and anxiety during the COVID-19 pandemic [42], which also confirms the results obtained in our study. Esteban-Gonzalo et al. reported that the level of concern about COVID-19-related symptoms and disease complications, infection and consequences for the child, restrictive measures and isolation due to COVID-19, delivery, postpartum and breastfeeding were also associated with higher levels of anxiety in pregnant women [43].

Our study found that pregnant women showed a relatively high acceptance of COVID-19 vaccination, with 51% of pregnant women saying that they would get vaccinated, but only 25% of the pregnant women surveyed commented that COVID-19 vaccination "is safe and necessary". Different results were obtained by Ayhan et al., who conducted their study in a population of pregnant women in Turkey. In this study, only 37% of women were willing to receive the vaccine [44]. In the same Turkish study, among women who refused the vaccine, up to 66% cited lack of safety data on COVID-19 vaccine in pregnant women as the reason, whereas 42% of women claimed that the vaccine would harm their unborn child [44]. A similar response on the occurrence of defects in the child was chosen by 20% of the pregnant women surveyed in our study. Pregnant women in the Czech Republic also showed acceptance of COVID-19 vaccine (up to 76.6%), with the safety of vaccines for their unborn children being their highest priority [45]. Tao et al. found that the level of acceptance of COVID-19 vaccine among Chinese pregnant women in November 2020 was 77.4%, with the insufficiently defined safety of the vaccine being the most important determinant of vaccine hesitancy [46]. Gancer et al. found that 29.6% of pregnant women in Turkey showed a reluctant attitude to vaccine. A belief that vaccines were not safe, concern about adverse effects and exposure to negative news from the media or the Internet were the most important reasons for vaccine hesitancy [40]. Studies in Malaysia, Turkey and Canada found that lack of confidence and fear of adverse effects were the most important reasons for vaccine hesitancy [47–49]. Those who experienced hesitancy were convinced that vaccination was associated with a higher risk than the infection itself [48]. Gencer et al. reported that the pandemic had a positive impact on pregnant women's decisions to vaccinate themselves and their children in the future [40].

In our study, the trimester of pregnancy was associated with an increase in coronavirus anxiety. The level of anxiety measured with FCV-19S increased with the trimester of pregnancy. In our study, the probability of receiving COVID-19 vaccine as measured with DrVac-COVID19S and VAC-COVID-19 was at a similar level in each trimester of pregnancy. Other studies demonstrated the highest levels of acceptance in pregnant women in the third trimester. A number of vaccines, including influenza vaccines, are recommended particularly

in the third trimester in many countries. It can be assumed that vaccination in the third trimester is widely accepted by both pregnant women and the rest of society [38,50–52]. Therefore, it is understandable that pregnant women avoid medications in the first trimester, which is closely related to the period of organogenesis taking place during this period of pregnancy [53].

Pain at the injection site was the most common vaccine-induced complication in the study group (52%). The same symptom occurred in 72% of controls. Influenza-like symptoms such as fever, chills and muscle pain occurred in 33% of pregnant women and 47% of controls. Baden et al. also found pain and oedema at the injection site and influenza-like symptoms to be the most common vaccine-induced complications [54]. Sadoff et al. described a study conducted in eight countries on three continents. Their data showed that pain at the injection site (48.6%), headache (38.9%), fatigue (38.2%) and muscle pain (33.2%) were the most common complications after receiving COVID-19 vaccine [55]. The European Medicines Agency (EMA) also reports that pain and tenderness at the injection site, headache, fatigue, myalgia, general malaise, chills, fever, arthralgia and nausea were the most common symptoms [56].

Our analysis shows that mRNA vaccine was the most preferred preparation in both study (66%) and control group (75%). Rzymski et al. also reported that the Polish population most frequently vaccinated with mRNA preparations [57]. Similarly, pregnant women from the Czech Republic, when asked about their preferred COVID-19 vaccine type, confirmed their confidence in mRNA-based vaccines to be as high as 58.6% [45].

The results of our study suggest that foetal safety of the unborn child is a major factor influencing pregnant women's decisions to receive the COVID-19 vaccine. The failure to include pregnant women in the COVID-19 vaccine study does not help with decision-making. Women should be supported with reliable information from trusted midwives and gynaecologists so that they can make an informed choice, guided by expert interpretation of the available data.

Limitations

This study has certain limitations. The presented results were obtained in a study based on a subjective assessment of feelings and symptoms of anxiety occurring in pregnant women and women of reproductive age. The study used standardised scales, which are sensitive research tools, but their assessment relies on subjective feelings and does not include objective criteria for clinical symptoms, which may contribute to false-positive results. Sample size is another limitation of the study. The small group included in the study does not allow the results to be generalised to the entire population of pregnant women in Poland. However, in spite of the limitations, the results presented may be a reference point for further research on the level of fear of COVID-19 and attitudes towards COVID-19 vaccines among women both in Poland and worldwide.

5. Conclusions

Pregnant women generally showed moderate COVID-19 anxiety, but the results varied depending on the tool used. VAC-COVID-19 and DrVac-COVID19S scores confirmed the high level of vaccine acceptance among the women surveyed and positive attitudes towards it. There was a strong positive correlation between VAC-COVID-19 and DrVac-COVID19S. Insufficient knowledge of the effects or complications of the vaccine in the foetus were the most common reason for COVID-19 vaccine refusal among pregnant women. The availability of accurate information can positively influence vaccination rates in this population. The results for this particular sample are linked to the results of national and international studies. It is advisable to develop new training projects for healthcare system employees, in particular in the field of perinatal care, in order to better identify and take into account COVID-19 stressors and provide the best psychological support based on the needs and requirements related to this challenge, as well as apply a system of incentives for vaccination against COVID-19, taking into account the benefits for both

expectant mothers and their unborn children. Moreover, the topic should be explored in more detail, to this end by carrying out longitudinal studies.

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10. STRESZCZENIE W JĘZYKU POLSKIM

WSTĘP: Pandemia COVID-19 wywołała lęk i niepokój na całym świecie. Kobiety w ciąży są szczególnie podatne na lęk i stres, a pandemia COVID-19 z pewnością przyczyniła się do wzrostu symptomów lęku w tej grupie. Ponadto, ta grupa kobiet jest szczególnie narażona, zarówno na zachorowanie na COVID-19, jak i powikłania poinfekcyjne.

CEL PRACY: Ocena występowania symptomów lęku przed COVID-19 wśród kobiet ciężarnych w Polsce.

MATERIAŁ I METODY: Badanie przedstawione w artykule nr 1 objęło 173 kobiety ciężarne na różnym etapie ciąży. W badaniu wykorzystano autorski kwestionariusz ankiety oraz następujące standaryzowane skale badawcze: Inwentarz Stanu i Cechy Lęku (*State-Trait Anxiety Inventory*, STAI), Inwentarz Lęku o Zdrowie (*Short Health Anxiety Inventory*, SHAI) i Kwestionariusz Lęku Uogólnionego (*General Anxiety Disorder-7*, GAD–7). W drugim badaniu (artykuł nr 2) udział wzięło 595 kobiet, w tym: 288 kobiet ciężarnych (grupa badana) oraz 307 kobiet w wieku reprodukcyjnym (grupa kontrolna). W badaniu wykorzystano autorski kwestionariusz ankiety oraz następujące standaryzowane skale badawcze: dwie Skale Lęku przed Koronawirusem (*The Fear of COVID-19 Scale*, FCV-19S i *Coronavirus Anxiety Scale*, CAS), Skalę Wskaźników Akceptacji Szczepień Przeciwko COVID-19 (*The Drivers of COVID-19 Vaccination Acceptance Scale*, DrVac-COVID-19S) oraz Skalę do Pomiaru Postrzegania Akceptacji Szczepionek Przeciwko SARS-CoV-2 (*Scale to Measure the Perception of SARS-CoV-2 Vaccines Acceptance*, The VAC-COVID-19 Scale).

WYNIKI: Kobiety hospitalizowane w czasie ciąży różniły się istotnie statystycznie pod względem wyników skali STAI-X1. Pierworódki uzyskały istotne statystycznie wyższe wyniki skali SHAI niż wieloródki. Również kobiety z wyższym wykształceniem uzyskały wyższe wyniki w skali SHAI. W skali GAD-7 13,3% respondentek uzyskało wynik sugerujący podejrzenie uogólnionego zaburzenia lękowego. Łagodny lęk odnotowano w przypadku skali CAS, podczas gdy skala FCV-19S wykazała umiarkowany poziom lęku. Zarówno kobiety w ciąży, jak i kobiety w wieku rozrodczym wykazały wysokie wyniki w skalach: VAC-COVID-19 i DrVac-COVID19S. Średnie wyniki w skali VAC-COVID-19 wyniosły 41,44 pkt w grupie badanej i 44,26 pkt w grupie kontrolnej, a średnie wyniki w skali DrVac-COVID19S wyniosły 51,25 pkt u kobiet w ciąży i 55,85 pkt u kobiet w wieku rozrodczym.

WNIOSKI: Kobiety ciężarne zasadniczo wykazywały umiarkowany poziom lęku przed COVID-19, który różnił się w zależności od użytego narzędzia badawczego.

11. STRESZCZENIE W JĘZYKU ANGIELSKIM

INTRODUCTION: The COVID-19 pandemic has caused fear and anxiety around the world. Pregnant women are particularly susceptible to anxiety and stress, and the COVID-19 pandemic has certainly contributed to an increase in anxiety symptoms in this group. In addition, this group of women is particularly vulnerable, both to contracting COVID-19 and to post-infection complications.

AIM: Assessment of the prevalence of COVID-19 anxiety symptoms among pregnant women in Poland.

MATERIAL AND METHODS: The study presented in Article 1 included 173 pregnant women at various stages of pregnancy. The study used a proprietary survey questionnaire and the following standardised research scales: State-Trait Anxiety Inventory (STAI), Short Health Anxiety Inventory (SHAI) and General Anxiety Disorder-7 (GAD-7). The second study (Article 2) involved 595 women, including: 288 pregnant women (study group) and 307 women of reproductive age (control group). The study used the author's survey questionnaire and the following standardised research scales: two fear of COVID-19 scales (The Fear of COVID-19 Scale, FCV-19S and Coronavirus Anxiety Scale, CAS), The Drivers of COVID-19 Vaccination Acceptance Scale (DrVac-COVID-19S) and the Scale to Measure the Perception of SARS-CoV-2 Vaccines Acceptance (The VAC-COVID-19 Scale).

RESULTS: There was a statistically significant difference in STAI-X1 scale scores of women hospitalized during pregnancy. Primiparous women had statistically significant higher SHAI scale scores than multiparous women. Women with higher education also scored higher on the SHAI scale. On the GAD-7 scale, 13.3% of female respondents scored suggestive of a suspected generalised anxiety disorder. Mild anxiety was reported for the CAS scale, while the FCV-19S scale showed a moderate level of anxiety. Both pregnant women and women of childbearing age showed high scores on the scales: VAC-COVID-19 and DrVac-COVID19S. Mean scores on the VAC-COVID-19 scale were 41.44 points in the study group and 44.26 points in the control group, and mean scores on the DrVac-COVID19S scale were 51.25 points in pregnant women and 55.85 points in women of childbearing age.

CONCLUSIONS: Pregnant women generally showed moderate levels of anxiety about COVID-19, which varied depending on the survey tool used.

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13. OŚWIADCZENIE AUTORA

Informacja o charakterze udziału współautorów w publikacji:

An Assessment of the Level of COVID-19 Anxiety among Pregnant Women in Poland: A Cross-Sectional Study

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Imię i nazwisko współautora	Charakter udziału	Procentowy wkład
mgr Kinga Janik	stworzenie koncepcji pracy, przygotowanie narzędzia badawczego, rekrutowanie uczestników badania, zbieranie i opracowanie danych, analiza wyników, przygotowanie manuskryptu	65%
dr Urszula Cwalina	analiza statystyczna zgromadzonych danych	10%
prof. dr hab. Grażyna Iwanowicz-Palus	konceptualizacja badania, opracowanie metodologii badania, krytyczna weryfikacja i recenzja przygotowanego manuskryptu	10%
prof. dr hab. Mateusz Cybulski	konceptualizacja badań, przeprowadzenie badań, opracowanie metodologii badania, sprawowanie nadzoru nad realizacją badań, krytyczna weryfikacja i recenzja przygotowanego manuskryptu	15%

Oświadczam, że wszyscy współautorzy wyrazili zgodę na wykorzystanie powyższej publikacji w rozprawie doktorskiej.

Kinga Janik

.....

podpis doktoranta

Potwierdzam opisany powyżej merytoryczny wkład kandydata w powstanie publikacji wchodzącej w skład rozprawy doktorskiej.

Cybulski Mateusz

.....

podpis promotora

Informacja o charakterze udziału współautorów w publikacji:

Fear of COVID-19 and Vaccine Hesitancy among Pregnant Women in Poland: A Cross-Sectional Study

Kinga Janik, Kinga Nietupska, Grażyna Iwanowicz-Palus, Mateusz Cybulski

opublikowanej w *Vaccines 2022; 10(10): 1700.*

Imię i nazwisko współautora	Charakter udziału	Procentowy wkład
mgr Kinga Janik	stworzenie koncepcji pracy, przygotowanie narzędzia badawczego, rekrutowanie uczestników badania, zbieranie i opracowanie danych, analiza wyników, przygotowanie manuskryptu	70%
lek. Kinga Nietupska	rekrutowanie uczestników badania, zbieranie danych	5%
prof. dr hab. Grażyna Iwanowicz-Palus	konceptualizacja badania, opracowanie metodologii badania, krytyczna weryfikacja i recenzja przygotowanego manuskryptu	10%
prof. dr hab. Mateusz Cybulski	konceptualizacja badań, przeprowadzenie analizy formalnej, opracowanie metodologii badania, krytyczna weryfikacja i recenzja przygotowanego manuskryptu	15%

Oświadczam, że wszyscy współautorzy wyrazili zgodę na wykorzystanie powyższej publikacji w rozprawie doktorskiej.

Kinga Janik

.....

podpis doktoranta

Potwierdzam opisany powyżej merytoryczny wkład kandydata w powstanie publikacji wchodzącej w skład rozprawy doktorskiej.

Cybulski Mateusz

.....

podpis promotora

14. OŚWIADCZENIA WSPÓŁAUTORÓW

Białystok, dn. 06.08.2024

prof. dr hab. Mateusz Cybulski

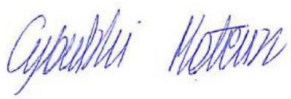
Zakład Zintegrowanej Opieki Medycznej

Uniwersytet Medyczny w Białymstoku

OŚWIADCZENIE

Oświadczam, iż mój udział w przygotowaniu publikacji *An Assessment of the Level of COVID-19 Anxiety among Pregnant Women in Poland: A Cross-Sectional Study* autorstwa: **Janik K, Cwalina U, Iwanowicz-Palus G, Cybulski M**, opublikowanej w czasopiśmie *Journal of Clinical Medicine*, wchodzącej w skład rozprawy doktorskiej **mgr Kingi Janik** pt.: *„Ocena występowania symptomów lęku przed COVID-19 wśród kobiet ciężarnych"* polegał na: konceptualizacji badań, przeprowadzeniu badań, opracowaniu metodologii badania, sprawowaniu nadzoru nad realizacją badań oraz krytycznej weryfikacji i recenzji przygotowanego manuskryptu.

Jednocześnie wyrażam zgodę na wykorzystanie przez mgr Kingę Janik ww. publikacji w postępowaniu o nadanie stopnia doktora w dziedzinie nauk medycznych i nauk o zdrowiu w dyscyplinie nauki o zdrowiu.



Lublin, 06.08.2024

prof. dr hab. Grażyna Iwanowicz-Palus

Zakład Opieki Specjalistycznej w Położnictwie

Katedra Rozwoju Położnictwa

Uniwersytet Medyczny w Lublinie

OŚWIADCZENIE

Oświadczam, iż mój udział w przygotowaniu publikacji *An Assessment of the Level of COVID-19 Anxiety among Pregnant Women in Poland: A Cross-Sectional Study* autorstwa: **Janik K, Cwalina U, Iwanowicz-Palus G, Cybulski M**, opublikowanej w czasopiśmie *Journal of Clinical Medicine*, wchodzącej w skład rozprawy doktorskiej **mgr Kingi Janik** pt.: *„Ocena występowania symptomów lęku przed COVID-19 wśród kobiet ciężarnych"* polegał na: konceptualizacji badania, opracowaniu metodologii badania oraz krytycznej weryfikacji i recenzji przygotowanego manuskryptu.

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Podpisano przez/ Signed by:
GRAŻYNA
IWANOWICZ-PALUS
Data/ Date: 06.08.2024 22:06
mSzafir

Urszula Cwalina
Zakład Biostatystyki i Informatyki Medyycznej
Uniwersytet Medyczny w Białymstoku

Białystok, 10.08.2024

OŚWIADCZENIE

Oświadczam, iż mój udział w przygotowaniu publikacji *An Assessment of the Level of COVID-19 Anxiety among Pregnant Women in Poland: A Cross-Sectional Study* autorstwa: **Janik K, Cwalina U, Iwanowicz-Palus G, Cybulski M**, opublikowanej w czasopiśmie *Journal of Clinical Medicine*, wchodzącej w skład rozprawy doktorskiej **mgr Kingi Janik** pt.: *„Ocena występowania symptomów lęku przed COVID-19 wśród kobiet ciężarnych”* polegał na analizie statystycznej zgromadzonych danych.

Jednocześnie wyrażam zgodę na wykorzystanie przez mgr Kingę Janik ww. publikacji w postępowaniu o nadanie stopnia doktora w dziedzinie nauk medycznych i nauk o zdrowiu w dyscyplinie nauki o zdrowiu.

Białystok, dn. 06.08.2024

prof. dr hab. Mateusz Cybulski

Zakład Zintegrowanej Opieki Medycznej

Uniwersytet Medyczny w Białymstoku

OŚWIADCZENIE

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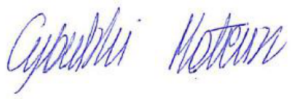

Lublin, 06.08.2024

prof. dr hab. Grażyna Iwanowicz-Palus

Zakład Opieki Specjalistycznej w Położnictwie

Katedra Rozwoju Położnictwa

Uniwersytet Medyczny w Lublinie

OŚWIADCZENIE

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Podpisano przez/ Signed by:
GRAŻYNA
IWANOWICZ-PALUS
Data/ Date: 06.08.2024 22:06
mSzafir

Kinga Nietupska
Samodzielny Publiczny Zakład Opieki Zdrowotnej
w Sokółce

Białystok, 8.08.2024

OŚWIADCZENIE

Oświadczam, iż mój udział w przygotowaniu publikacji *Fear of COVID-19 and Vaccine Hesitancy among Pregnant Women in Poland: A Cross-Sectional Study* autorstwa: **Janik K, Nietupska K, Iwanowicz-Palus G, Cybulski M**, opublikowanej w czasopiśmie *Vaccines*, wchodzącej w skład rozprawy doktorskiej **mgr Kingi Janik** pt.: *„Ocena występowania symptomów lęku przed COVID-19 wśród kobiet ciężarnych"* polegał na: rekrutowaniu uczestników badania oraz zbieraniu danych.

Jednocześnie wyrażam zgodę na wykorzystanie przez mgr Kingę Janik ww. publikacji w postępowaniu o nadanie stopnia doktora w dziedzinie nauk medycznych i nauk o zdrowiu w dyscyplinie nauki o zdrowiu.

Kinga Nietupska

15. ZGODY KOMISJI BIOETYCZNEJ

KOMISJA BIOETYCZNA
PRZY UNIWERSYTECIE MEDYCZNYM W BIAŁYMSTOKU
ul. Jana Kilińskiego 1
15-089 Białystok
tel. 85 748 54 07, fax 85 748 55 08
komisjabioetyczna@umb.edu.pl

Białystok, 29.04.2021 r.

Uchwała nr: APK.002.248.2021

Na podstawie art. 29 ust. 2 i 14 ustawy dnia 5 grudnia 1996 r. o zawodach lekarza i lekarza dentysty (t.j. Dz. U z 2020, poz. 514 ze zm.), Komisja Bioetyczna przy Uniwersytecie Medycznym w Białymstoku, po zapoznaniu się z projektem badania zgodnie z zasadami GCP/ Guidelines for Good Clinical Practice /- **w y r a ż a z g o d ę** na prowadzenie tematu badawczego: „Ocena występowania symptomów lęku przed COVID-19 wśród kobiet ciężarnych" przez mgr Kingę Janik wraz z zespołem badawczym z UMB.

Planowany okres realizacji od 29.04.2021 r. do 30.09.2022 r.

Przewodnicząca Komisji Bioetycznej przy UMB

prof. dr hab. Otylia Kowal-Bielecka

Pouczenie:
1. Odwołanie od uchwały komisji bioetycznej wyrażającej opinię może wnieść:
1) wnioskodawca;
2) kierownik podmiotu, w którym eksperyment medyczny ma być przeprowadzony;
3) komisja bioetyczna właściwa dla ośrodka, który ma uczestniczyć w wieloośrodkowym eksperymencie medycznym.
2. Odwołanie, o którym mowa w ust. 1, wnosi się za pośrednictwem komisji bioetycznej, która podjęła uchwałę, do Odwoławczej Komisji Bioetycznej w terminie 14 dni od dnia doręczenia uchwały wyrażającej opinię.

KOMISJA BIOETYCZNA
PRZY UNIWERSYTECIE MEDYCZNYM W BIAŁYMSTOKU
ul. Jana Kilińskiego 1
15-089 Białystok
tel. 85 748 54 07, fax 85 748 55 08
komisjabioetyczna@umb.edu.pl

Białystok, 20.01.2022 r.

Uchwała nr: APK.002.55.2022

Na podstawie art. 29 ust. 2 i 14 ustawy dnia 5 grudnia 1996 r. o zawodach lekarza i lekarza dentysty (t.j. Dz. U z 2020, poz. 514 ze zm.), Komisja Bioetyczna przy Uniwersytecie Medycznym w Białymstoku, po zapoznaniu się z projektem badania zgodnie z zasadami GCP/ Guidelines for Good Clinical Practice /- **w y r a ż a z g o d ę** na prowadzenie tematu badawczego: „Ocena występowania symptomów lęku przed COVID-19 i postrzeganie szczepień przeciwko COVID-19 wśród kobiet ciężarnych" przez mgr Kingę Janik wraz z zespołem badawczym z UMB.

Planowany okres realizacji od 20.01.2022 r. do 30.09.2023 r.

Z-ca Przewodniczącej Komisji Bioetycznej przy UMB

dr n. farm. Krzysztof Chrzanowski

Pouczenie:
1. Odwołanie od uchwały komisji bioetycznej wyrażającej opinię może wnieść:
1) wnioskodawca;
2) kierownik podmiotu, w którym eksperyment medyczny ma być przeprowadzony;
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