Katedra i Klinika Geriatrii
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ROZPRAWA DOKTORSKA

Wpływ czynników psychofizycznych i socjoekonomicznych na podatność pacjentów geriatrycznych na działania prewencyjne i terapeutyczne

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Podziękowania

Składam wyrazy wdzięczności ***Pani Profesor Małgorzacie Sobieszczańskiej*** *za opiekę merytoryczną, cenne uwagi i sugestie oraz zaangażowanie, dzięki którym możliwe było powstanie tej pracy. Dziękuję także za życzliwość i uśmiech, które zawsze towarzyszyły naszej współpracy.*

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SPIS TREŚCI

WYKAZ SKRÓTÓW UŻYTYCH W PRACY

ACEI (Angiotensin-Converting Enzyme Inhibitors) – inhibitor konwertazy angiotensyny
ADL (Activities of Daily Living) – skala oceny podstawowych czynności życia codziennego
AMTS (Abbreviated Mental Test Score) – skrócony test sprawności umysłowej
AST – astma
AUC (area under the ROC curve) – wielkość pola pod krzywą
BMI (Body Mass Index) – wskaźnik masy ciała
CAD (Coronary Artery Disease) – choroba wieńcowa
CDC (Center for Disease Control and Prevention) – Centrum Kontroli i Prewencji Chorób
CGA (Comprehensive Geriatric Assessment) – Całościowa Ocena Geriatryczna
CI (Confidence Interval) – przedział ufności
COPD (Chronic Obstructive Pulmonary Disease) – przewlekła obturacyjna choroba płuc
DM (Diabetes Mellitus) – cukrzyca
EUR - Euro
FCV-19S (Fear of COVID-19 Scale) – Skala lęku przed zakażeniem COVID-19
GAS-10 (Geriatric Anxiety Scale-10) – Geriatryczna skala lęku
GDS-15 (Geriatric Depression Scale-15) – Geriatryczna skala oceny depresji
GERD (Gastroesophageal Reflux Disease) – refluks żołądkowo - przełykowy
GLS (Gierveld Loneliness Scale) – Skala samotności Giervalda
GP (General Practitioner) – lekarz podstawowej opieki zdrowotnej
HF (Heart Failure) – niewydolność serca
IADL (Instrumental Activity of Daily Life) – Skala oceny złożonych czynności życia codziennego
IVCRs (Influenza Vaccination Coverage Rates) – wskaźnik wyszczepienia przeciw grypie
LR (Likelihood Ratio) – iloraz prawdopodobieństwa
LSNS-6 (Lubben Social Network Scale) – Skala izolacji społecznej Lubbena
M (Mean) – średnia
Me (Median) – mediana
MNA (Mini Nutritional Assessment) – Skala odżywienia
OR (Odds Ratio) – iloraz szans
OTC (Over The Counter) – lek sprzedawany bez recepty
p (probability)– poziom istotności
PIM (Potentially Inappropriate Medications) – leki potencjalnie nieodpowiednie
PPO (Potential Prescribing Omission) – leki potencjalnie pominięte
PLN – polski złoty
Q (Quartile) – kwartyl
SARS-CoV-2 (Severe Acute Respiratory Syndrome Coronavirus 2) – drugi koronawirus ciężkiego ostrego zespołu oddechowego
SD (Standard Deviation) – odchylenie standardowe
SMC (Specialist Medical Care) – specjalistyczna opieka medyczna
WHO (World Health Organisation) – Światowa Organizacja Zdrowia

WPROWADZENIE

Lekarze sprawujący opiekę nad pacjentami w wieku podeszłym mierzą się z licznymi wyzwaniami, wynikającymi z odrębności cechujących populację geriatryczną w porównaniu z młodszymi osobami dorosłymi. Wraz z wiekiem zwiększa się częstość występowania licznych chorób przewlekłych [1]. W badaniu PolSenior-2, w ramach którego przebadano reprezentatywną próbę 5987 mieszkańców Polski w wieku od 60 do 106 lat, występowanie wielochorobowości (dwóch i więcej chorób) stwierdzono u 70% osób w populacji 60–64 lat i u 90% w grupie 90-latków [2].

Wielochorobowość wymaga stosowania zindywidualizowanego podejścia do diagnostyki pacjenta oraz wdrożenia złożonego schematu leczenia farmakologicznego, co z kolei prowadzi do wzrostu częstości występowania wielolekowości i ryzyka polipragmazji, stanowiącej istotny problem wśród starszych pacjentów [3]. Zgodnie z wynikami badania PolSenior-2, średnia liczba leków recepturowych wśród polskich seniorów wynosiła 4,22 i rosła wraz z wiekiem, osiągając najwyższą wartość (5,97) w grupie wiekowej 85–89 lat. Politerapia (5 i więcej leków) dotyczyła 50% badanych i wyraźnie wzrastała z wiekiem. W grupie po 80. r.ż. stwierdzono ją u 75% osób, w tym 10 i więcej leków zażywało 12% najstarszej populacji. Z kolei suplementy diety, często także wchodzące w interakcje z lekami, zażywa 32% polskich seniorów [2].

Stosowanie wielu leków i suplementów zwiększa ryzyko agregacji ich działań niepożądanych oraz wystąpienia groźnych dla zdrowia skutków ich interakcji, prowadząc do jatrogennego zespołu geriatrycznego, a także pogarszając efekty współpracy lekarza z pacjentem. Polifarmakoterapia może nasilać niebezpieczeństwo upadków, implikować pogorszenie zdolności poznawczych i stanu funkcjonalnego starszej osoby, jak również wydłużać czas pobytu pacjenta w szpitalu i zwiększać ryzyko re-hospitalizacji, a finalnie grozi wyższą śmiertelnością i wzrostem kosztów opieki zdrowotnej [2-6].

Jak wiadomo, osoby w wieku geriatrycznym, w odróżnieniu od młodszych osób, są bardziej narażone na ciężki przebieg zakażeń wirusowych, m.in. grypy czy COVID-19 oraz rozwinięcie różnych, groźnych powikłań poinfekcyjnych [7]. Zaobserwowano, że pacjenci cierpiący z powodu chorób przewlekłych, którzy wymagali hospitalizacji z powodu grypy, w przeciągu kolejnego roku częściej doświadczali zaostrzeń przewlekłych chorób podstawowych, które także musiały być leczone w warunkach szpitalnych [8]. Najskuteczniejszą metodą ochrony przed grypą jest oczywiście szczepienie, które, zgodnie z zaleceniami WHO, powinno być wykonywane corocznie. Poziom wyszczepienia przeciw

grypie różni się w zależności od kraju i badanej populacji, a w Polsce, mimo prawie dwukrotnego wzrostu w porównaniu do lat wcześniejszych, jest nadal bardzo niski i w sezonie 2021/2022 wynosił 7% w populacji ogólnej oraz 22,6% wśród osób 65+ [9-11]. Wobec cięższego przebiegu choroby i zwiększonego ryzyka powikłań pogrypowych, objęcie szczepieniem ochronnym jak największej liczby seniorów ma kluczowe znaczenie.

Kolejnym problemem specyficznym dla osób w podeszłym wieku jest większa podatność na doświadczanie uczucia samotności, izolacji, lęku i depresji [12]. Sytuacja epidemiologiczna związana z pandemią COVID-19 przyczyniła się do wyraźnego przyrostu populacji osób borykających się na co dzień z obniżeniem nastroju i lękiem. Ta niepokojąca tendencja ujawniła się szczególnie wyraźnie wśród starszych osób [13-14]. Doświadczanie „wolno płynącego" lęku obniża komfort życia pacjentów i może prowadzić do pogorszenia funkcji poznawczych, dekompensacji schorzeń przewlekłych i wystąpienia ostrych incydentów sercowo-naczyniowych oraz nasilenia odczuwania bólu [15-17].

Prognozy demograficzne wskazują, że populacja powyżej 65. roku życia, a zwłaszcza powyżej 80. roku życia, jest grupą wiekową najszybciej zwiększającą swoją liczebność. Szacuje się, że odsetek osób powyżej 65. roku życia w 2050 r. stanowić będzie aż 1/3 ludności Polski. Już teraz osoby w wieku podeszłym stanowią dominującą grupę pacjentów zgłaszających się do lekarzy POZ i różnych specjalności, co generuje istotne koszty dla systemu ochrony zdrowia [18]. W związku z tym identyfikacja osób obciążonych zwiększonym ryzykiem pogorszenia stanu zdrowia powinna być priorytetem medycyny prewencyjnej i zdrowia publicznego. Stratyfikacja ryzyka odgrywa kluczową rolę w podejmowaniu decyzji terapeutycznych i alokacji zasobów publicznych oraz wyznacza kierunki badań naukowych [19-21].

ZAŁOŻENIA I CELE PRACY

W obliczu przytoczonych powyżej faktów za niezwykle ważną należy uznać potrzebę prowadzenia badań, które mogą dostarczyć danych potencjalnie poprawiających efektywność zarówno kompleksowej opieki zdrowotnej, jak i działań profilaktycznych w populacji geriatrycznej. W prezentowanej pracy, której wyniki opublikowano w cyklu trzech artykułów naukowych, podjęto próbę przeanalizowania kilku wybranych aspektów mających wpływ na stan zdrowia i jakość życia osób w wieku podeszłym.

Za cel główny prezentowanych badań przyjęto określenie wpływu czynników psychofizycznych i socjoekonomicznych na zachowania profilaktyczne, zakres farmakoterapii i stan psychiczny osób w wieku 60 i więcej lat. Cele szczegółowe sformułowano następująco:

1. Określenie poziomu wyszczepienia przeciw grypie osób ≥ 60. roku życia w populacji polskiej w latach 2019–2020.
2. Zidentyfikowanie czynników psychofizycznych i socjoekonomicznych wpływających na przyjęcie szczepionki przeciw grypie w populacji geriatrycznej oraz przyczyn negatywnego stosunku pacjentów do tego szczepienia.
3. Określenie poziomu lęku przed zachorowaniem na COVID-19 i ocena jego wpływu na gotowość osób w wieku podeszłym do zaszczepienia się przeciw grypie.
4. Zidentyfikowanie subpopulacji narażonych na największe ryzyko odczuwania lęku przed COVID-19.
5. Określenie grup leków najczęściej stosowanych przez osoby ≥ 60. roku życia.
6. Ustalenie zależności między czynnikami socjoekonomicznymi oraz psychofizycznymi a przyjmowaniem farmaceutyków z poszczególnych grup.
7. Określenie czynników socjoekonomicznych i psychofizycznych wpływających na stosowanie większej liczby leków.

GRUPA BADANA I METODY

Grupa badana

Badanie zostało przeprowadzone w okresie dwóch miesięcy, listopadzie i grudniu 2020 roku, na grupie 500 osób w wieku 60 i więcej lat (M = 67,9 lat; SD = 4,2) mieszkających w Polsce, w skład której wchodziło 290 kobiet (58%) oraz 210 mężczyzn (42%). Współczynnik odpowiedzi na pytania ankietowe wyniósł 40%.

Osoby włączone do badania zostały zakwalifikowane na podstawie losowania warstwowego, uwzględniającego kryterium płci i wieku dla każdego rejonu geograficznego Polski. Dane zbierane były drogą telefoniczną. Uczestnicy na początku rozmowy wyrażali swoją zgodę na udział w badaniu. Za udział w badaniu nie przysługiwało żadne wynagrodzenie.

Metody

Podczas rozmowy uczestnicy badania proszeni byli o udzielenie odpowiedzi na pytania ankiety przygotowanej przez zespół badawczy oraz pytania z walidowanych kwestionariuszy stosowanych w geriatrii. Autorska ankieta pozwoliła na zebranie danych demograficznych, socjoekonomicznych oraz wybranych parametrów antropometrycznych i klinicznych, a także informacji dotyczących poddawania się szczepieniom ochronnym przeciw grypie oraz leków stosowanych na stałe.

Do zastosowanych walidowanych kwestionariuszy należały:

- Skala oceny podstawowych czynności życia codziennego (ADL);
- Skala złożonych czynności życia codziennego (IADL);
- Geriatryczna skala oceny depresji (GDS-15);
- Skrócony test sprawności umysłowej (AMTS);
- Geriatryczna skala lęku (GAS-10);
- Skala samotności Giervelda;
- Skala izolacji społecznej Lubbena (LSNS-6);
- Skala odżywienia (MNA).

Powyższe kwestionariusze posłużyły do szczegółowego określenia występowania licznych czynników psychofizycznych i dostarczyły wielu danych klinicznych dotyczących badanej grupy. Przeprowadzona została także walidowana ankieta dotycząca poziomu lęku odczuwanego w związku z trwającą wówczas pandemią COVID-19, tj. skala lęku przed zakażeniem COVID-19 (FCS-19S).

Formularze użyte w badaniu zawarto w rozdziale 15. niniejszej rozprawy.

METODY STATYSTYCZNE

Do prezentacji zmiennych jakościowych oraz porządkowych posłużono się tabelami prezentującymi częstość występowania danego przypadku oraz jego odsetek (%). Zmienne ilościowe o rozkładzie zbliżonym do normalnego przedstawiono w formie wartości średnich i odchyleń standardowych, natomiast w przypadku rozkładu różnego od normalnego – za pomocą mediany z pierwszym i trzecim kwartylem (Q). Ocenę zgodności rozkładu zmiennej z rozkładem normalnym przeprowadzono przy użyciu testu Kołmogorowa Smirnowa.

Do oceny różnic w rozkładzie zmiennych jakościowych między grupami użyto testu zgodności chi-kwadrat Pearsona. W celu oceny zmiennych ilościowych posłużono się testem U-Manna Whitneya w przypadku oceny różnic między dwiema grupami oraz testem Kruskalla Wallisa z testem *post hoc* porównań wielokrotnych z poprawką Bonferroniego Holma w przypadku więcej niż dwóch grup. Do oceny związków między dwiema zmiennymi ilościowymi posłużono się współczynnikiem korelacji rangowej Spearmana (Rho).

Zmienne wyrażone na skali ilorazowej oraz porządkowej, takie jak liczba podawanych leków, na potrzeby modelowania poddano dychotomizacji. Dla uzyskanych zmiennych jakościowych, w celu wytypowania ich predyktorów, przeprowadzono analizę krzywych ROC, w których punkt odcięcia wyznaczono w oparciu o indeks Youdena. Wyniki zostały przedstawione jako proponowany punkt odcięcia oraz odpowiadająca mu czułość i swoistość.

Do analizy związków zmiennych niezależnych z dychotomicznymi zmiennymi zależnymi posłużono się uogólnionym modelem liniowym z funkcją wiążącą „logit" (modelem regresji logistycznej). Wyniki analizy jednoczynnikowej przedstawiono jako odsetek przypadków prezentujących daną cechę oraz iloraz szans z 95% przedziałem ufności wraz z wartością p z testu chi-kwadrat. W modelu wieloczynnikowym dane przedstawiono także jako ilorazy szans, umieszczając również wartości współczynników regresji (beta) dla każdej zmiennej. Jakość modelu oceniono przy pomocy testu Hosmera-Lemenshowa oraz testu Walda i współczynnika prawdopodobieństwa (LR test). Za istotne przyjmowano wartości $p < 0,05$.

Analizę statystyczną wykonano przy użyciu oprogramowania Statistica v.13.3 (TIBCO Software Inc. Palo Alto, CA, USA).

WYKAZ PUBLIKACJI WCHODZĄCYCH W SKŁAD CYKLU

1. **Identification of Barriers Limiting the Use of Preventive Vaccinations against Influenza among the Elderly Population: A Cross-Sectional Analysis**
   Pietraszek A., Sobieszczańska M., Makuch S., Dróżdż M., Mazur G., Agrawal S.
   Vaccines 2022, Vol. 10, no. 5, art. 651
   doi.org/10.3390/vaccines10050651
   IF: **4,961**
   Punkty MEiN: **140,00**

2. **Sociodemographic and Health-related Factors Influencing Drug Intake among the Elderly Population.**
   Pietraszek A., Agrawal S., Dróżdż M., Makuch S., Domański I., Dudzik T., Dudek K., Sobieszczańska M.
   International Journal of Environmental Research and Public Health 2022, 19, 8766
   doi.org/10.3390/ijerph19148766
   IF: **4,614**
   Pkt. MEiN: **140,00**

3. **The Assessment of Fear of COVID-19 among the Elderly Population: A Cross-Sectional Study.**
   Agrawal S., Dróżdż M., Makuch S., **Pietraszek A**., Sobieszczańska M., Mazur G.
   Journal of Clinical Medicine 2021, Vol. 10, no. 23, art. 5537
   doi.org/ 10.3390/jcm10235537
   IF: **4,964**
   Pkt. MEiN: **140,00**

Sumaryczny IF: 14,539
Punkty MEiN: 420,00

OMÓWIENIE POSZCZEGÓLNYCH PUBLIKACJI

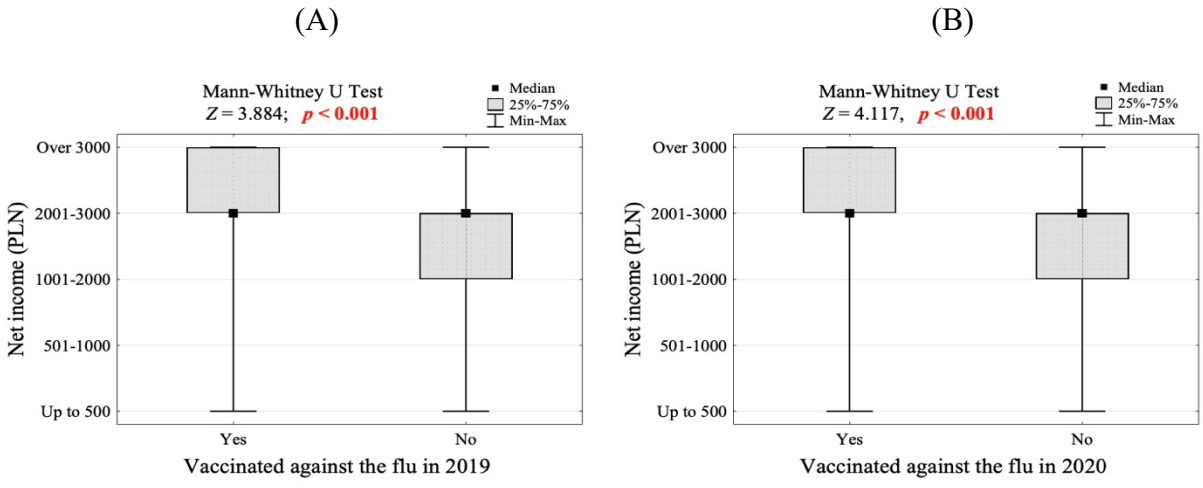
1. Identification of barriers limiting the use of preventive vaccinations against influenza among the elderly population: a cross-sectional analysis.

Artykuł zawiera wyniki badań dotyczących określenia w populacji geriatrycznej poziomu wyszczepienia przeciw grypie w latach 2019 i 2020 oraz zidentyfikowania czynników psychofizycznych i socjoekonomicznych mających wpływ na decyzję o przyjęciu lub nie tej szczepionki. W pracy ustalono również przyczyny niepoddawania się badanych osób szczepieniu przeciw grypie oraz określono wpływ lęku przed zachorowaniem na COVID-19 na gotowość do przyjęcia tego szczepienia.

Badaniem objęto populację 500 osób w wieku 60 i więcej lat, mieszkających w Polsce. Grupa badana została opisana we wcześniejszych rozdziałach dysertacji.

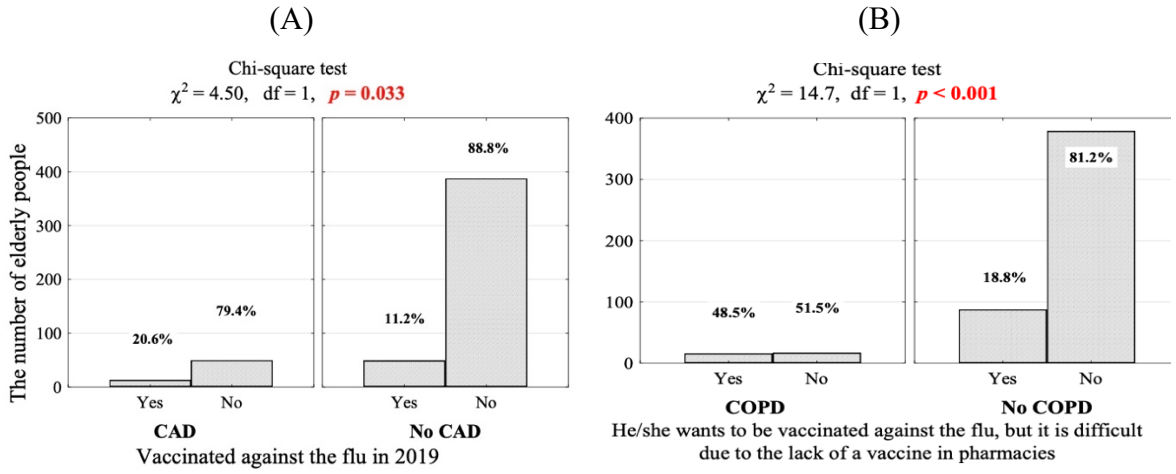
W publikacji zamieszczono wyniki wskazujące, że w latach 2019 i 2020 odpowiednio 12,4% oraz 10,2% respondentów objętych badaniem zostało zaszczepionych przeciw grypie. Głównymi czynnikami powodującymi tak niskie zainteresowanie szczepieniem był lęk przed możliwymi powikłaniami (32,8%) oraz brak dostępności szczepionki w aptekach (20,8%).

Najważniejszym czynnikiem wpływającym na chęć poddania się szczepieniu przeciw grypie był poziom dochodów *per capita* (Ryc.1). Osoby badane, których średni dochód na osobę w rodzinie przekraczał 3000 PLN, poddawały się szczepieniu częściej w porównaniu z osobami, których dochód wynosił mniej niż 3000 PLN na osobę (OR 2,37, CI 95% [1,26 – 4,47]).



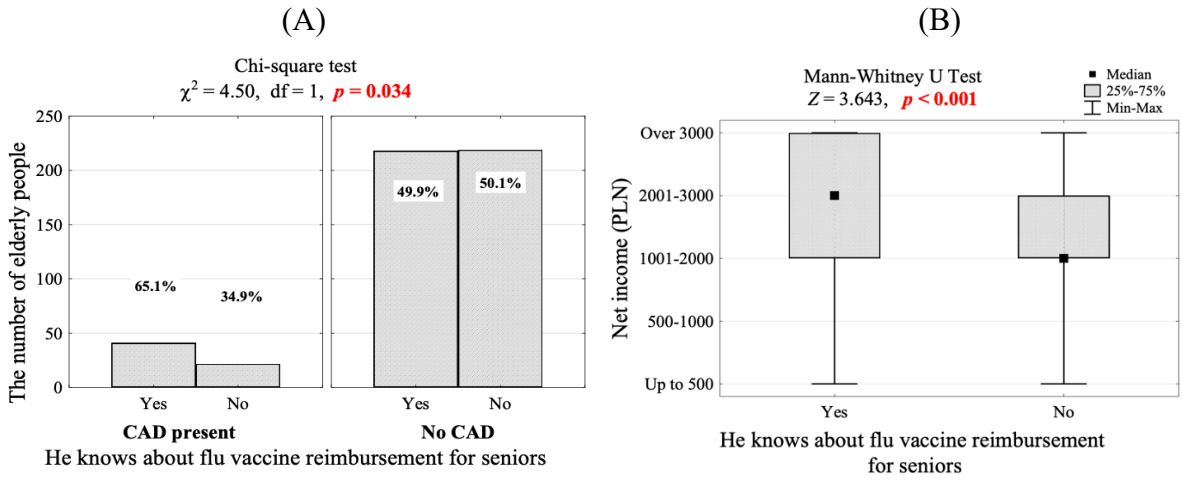
Ryc. 1. Miesięczny dochód netto na osobę w gospodarstwie domowym wśród osób, które przyjęły („yes") lub nie („no") szczepienie przeciw grypie w roku 2019 (A) i roku 2020 (B).

Ze szczepień chętniej korzystały osoby leczące się z powodu choroby wieńcowej (20,6% pacjentów z CAD vs 11,2% bez CAD; p=0,033) – Ryc. 2A. Wyższą gotowość do przyjęcia szczepienia, w porównaniu do osób bez tej choroby, wykazywali także pacjenci z POChP (48,5% pacjentów vs 18,8% respondentów bez POChP; p<0,001), jednak przeszkodą uniemożliwiającą przyjęcie szczepionki był jej niedobór w aptekach – Ryc. 2B.



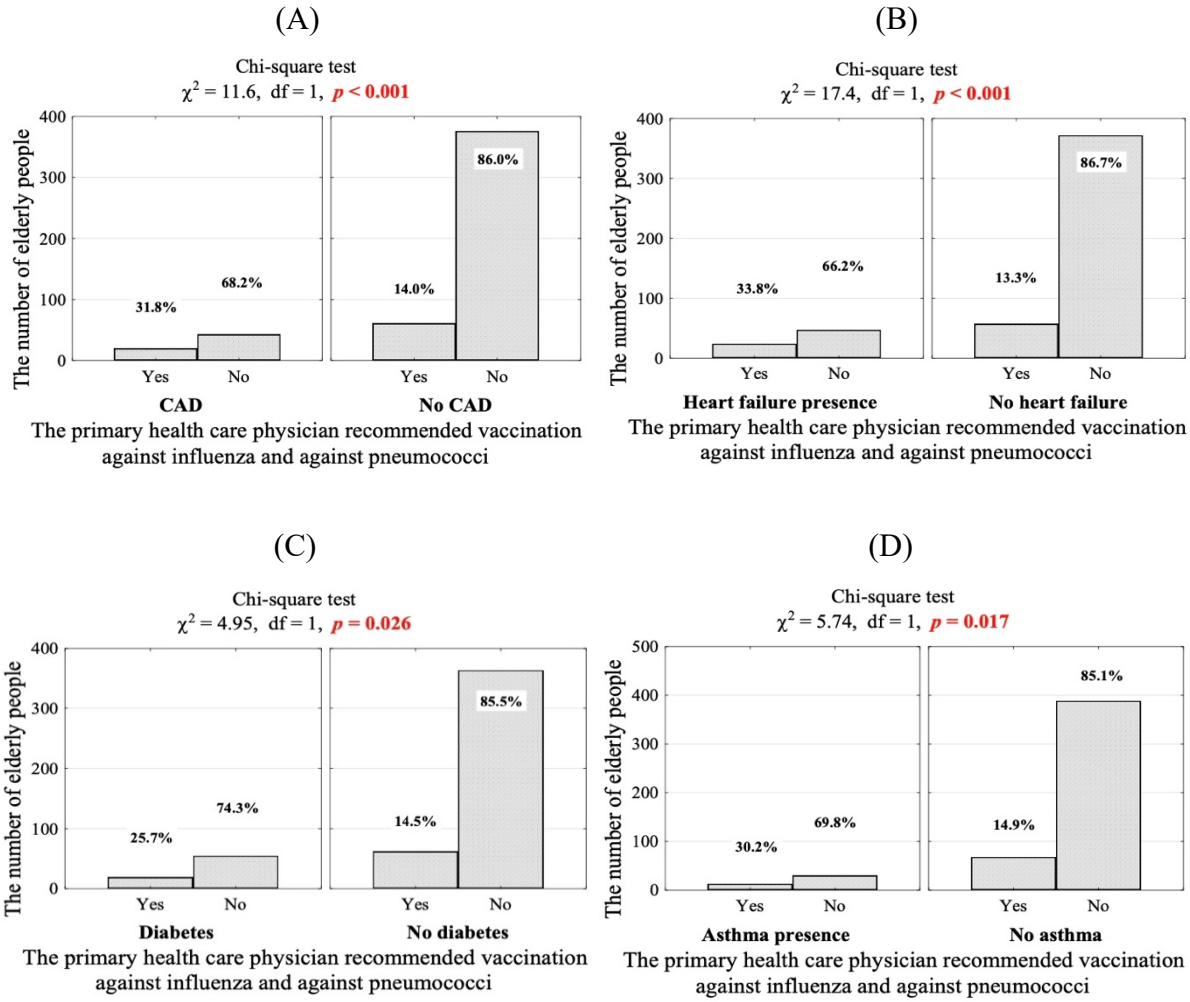
Ryc. 2. Procent osób zaszczepionych przeciw grypie w roku 2019 w zależności od obecności choroby niedokrwiennej serca (CAD) lub nie (no CAD) – (A) oraz chęć przyjęcia szczepienia przeciw grypie w zależności od obecności POChP (COPD) lub nie (no COPD) - (B).

Z przyjęcia szczepionki przeciw grypie częściej z kolei rezygnowały starsze osoby manifestujące wyższy poziom lęku przed COVID-19 (OR 1,65, CI 95% [1,02 – 2,66]).
O możliwości skorzystania z refundacji szczepionek przeciw grypie wiedziało tylko 51,8% badanych seniorów; częściej były to osoby z wyższym dochodem *per capita* w rodzinie oraz leczące się z powodu choroby niedokrwiennej serca (Ryc. 3).



Ryc. 3. Wiedza o możliwości refundacji szczepionki przeciw grypie dla seniorów w zależności od obecności choroby niedokrwiennej serca (CAD) lub bez tej choroby (no CAD) (A) oraz dochodu *per capita* w rodzinie (B).

Ponadto prezentowane w publikacji dane zwracają uwagę na fakt, że lekarze podstawowej opieki zdrowotnej rekomendowali pacjentom szczepienie przeciwko grypie i pneumokokom tylko w przypadku 81/500 osób (16,2% wszystkich badanych). Częściej miało to miejsce w sytuacji współistnienia chorób przewlekłych: choroby niedokrwiennej serca (31,8% vs 14,0% w przypadku nieobecności tej jednostki chorobowej; p<0,001), niewydolności serca (33,8% vs 13,3%, p<0,001), cukrzycy (25,7% vs 14,5%; p=0,026) i astmy oskrzelowej (30,2% vs 14,9%; p=0,017) – por. Ryc. 4.



Ryc. 4. Odsetek pacjentów, którym lekarz podstawowej opieki zdrowotnej rekomendował szczepienie przeciw grypie w przypadku obecności lub nie choroby niedokrwiennej serca (CAD) – (A); (B) niewydolności serca (heart failure); (C) cukrzycy (diabetes); (D) astmy oskrzelowej (asthma).

Pacjentom szczepienie rekomendowane było częściej także w sytuacji niższego poziomu odżywienia określonego przy użyciu skali MNA (p=0,008) oraz mniejszej sprawności w zakresie wykonywania złożonych czynności życia codziennego, ocenianej za pomocą skali IADL (p=0,001).

2. Sociodemographic and health-related factors influencing drug intake among the elderly population

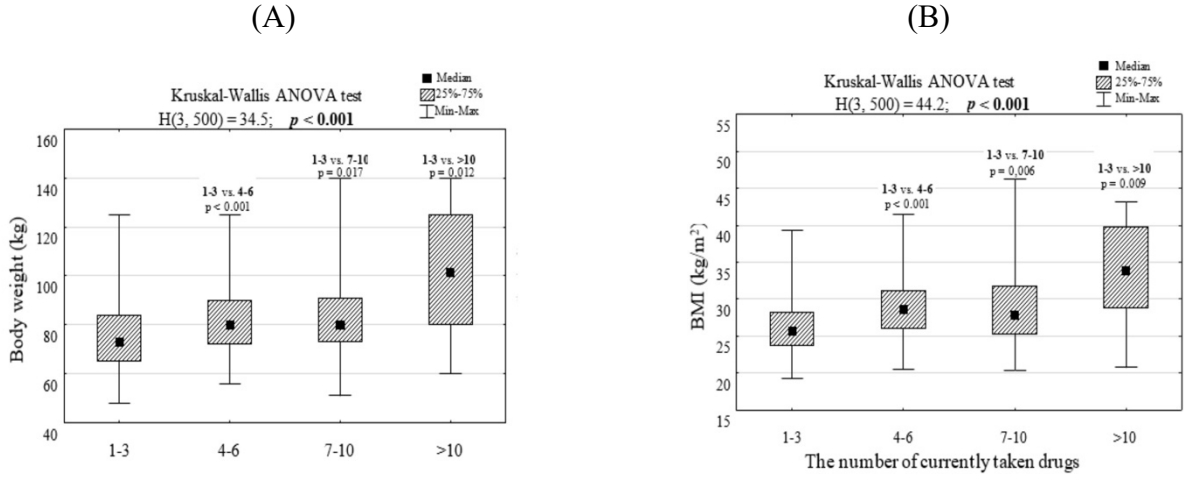
Celem badań opisanych w tej publikacji było ustalenie, które grupy leków, zarówno z tych dostępnych na receptę, jak i możliwych do kupienia bez preskrypcji lekarza (OCT), są przez osoby w wieku podeszłym stosowane najczęściej. Ustalono również zależności między czynnikami socjoekonomicznymi i psychofizycznymi a przyjmowaniem leków z poszczególnych grup oraz wpływem tych czynników na stosowanie większej całkowitej liczby farmaceutyków.

Badania objęły populację 500 osób ≥ 60 lat, mieszkających w Polsce. Grupa badana została opisana we wcześniejszych rozdziałach dysertacji.

Wyniki przestawione w powyższej publikacji wskazują, że do najczęściej stosowanych w populacji geriatrycznej w Polsce grup leków zaliczają się leki obniżające ciśnienie tętnicze krwi, które stosowało 51% osób uwzględnionych w badaniu oraz leki przeciwbólowe, używane przez 46% badanych respondentów. Z kolei leki dostępne bez recepty (OTC) przyjmowało aż 75,6% seniorów. Były to głównie witaminy oraz leki przeciwbólowe, które stosowało odpowiednio 69% i 61% badanych.

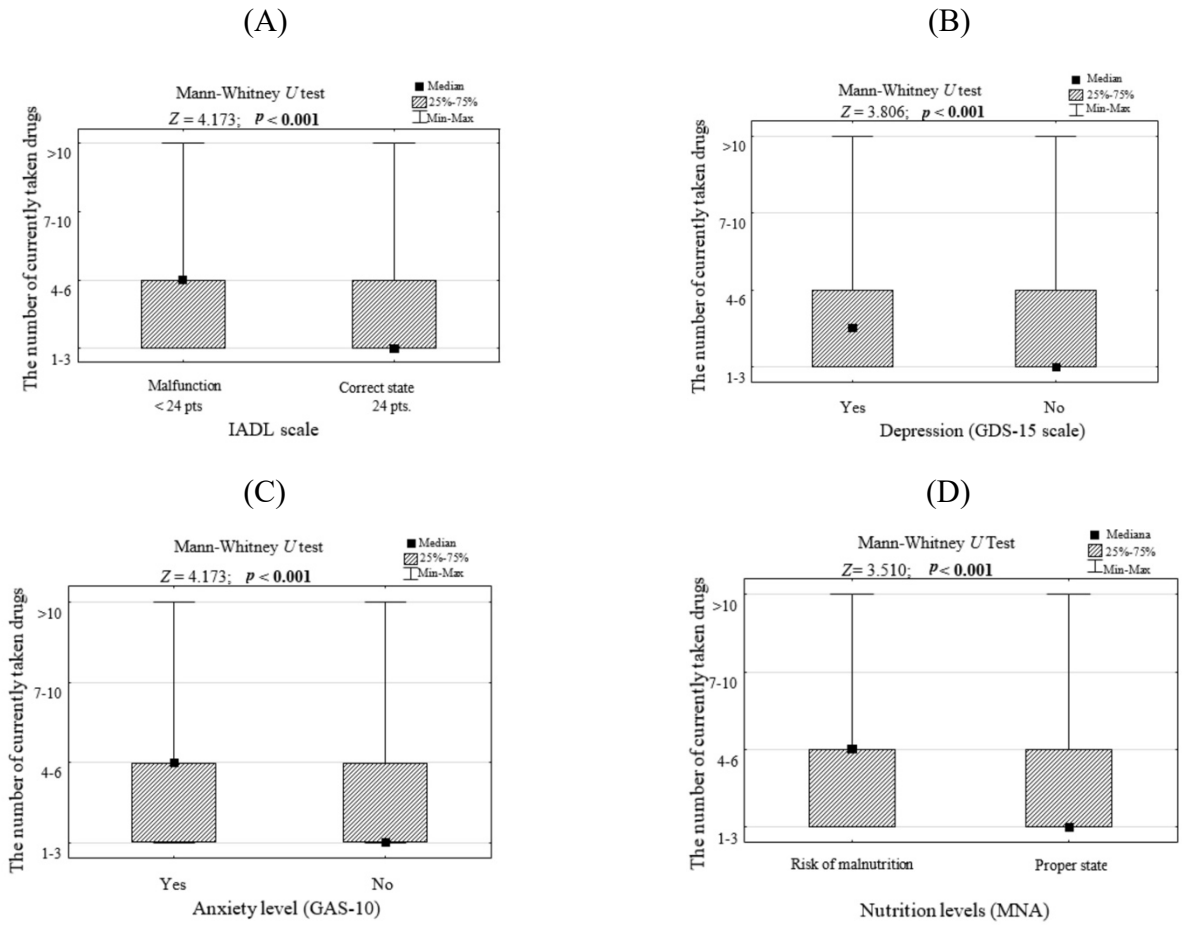
Ponad 1/5 badanych osób (21,8%) przyznała, że nie informuje swojego lekarza prowadzącego o nowych preparatach włączanych do terapii.

W omawianych badaniach zaobserwowano istotną statystycznie zależność pomiędzy przyjmowaniem przez badanych seniorów większej liczby leków wraz ze zwiększeniem się ich masy ciała i wartości BMI (p<0,001) – por. Ryc. 5.



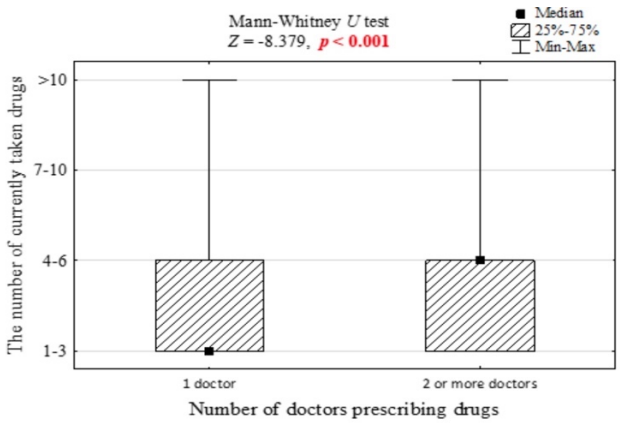
Ryc. 5. (A) masa ciała oraz (B) BMI w grupach badanych różniących się liczbą przyjmowanych leków.

U pacjentów z BMI >25,9 kg/m^2 ryzyko przyjmowania więcej niż 3 leków wzrastało ponad 2,5-krotnie (OR=2,68, CI 95% [1,50 – 4,77]), natomiast u tych, którzy leczyli się z powodu choroby wieńcowej – prawie 7-krotnie (OR=6,77, CI 95% [2,86-16,1]). Istotne statystyczne zależności w tym zakresie zaobserwowano także w przypadków osób leczących się z powodu cukrzycy (OR=3,23, CI 95% [1,75-5,95]), astmy (OR=4,87, CI 95% [2,13-11,1]), niewydolności serca (OR=3,38, CI 95% [1,59-7,19]) oraz refluksu żołądkowo – przełykowego (OR=1,93, CI 95% [1,03-3,62]). Ryzyko polifarmakoterapii okazało się zwiększać również w subpopulacjach badanych pacjentów, którzy gorzej radzili sobie ze złożonymi czynnościami dnia codziennego oraz uzyskiwali wyniki świadczące o występowaniu objawów depresji, podwyższonego poziomu lęku oraz niedożywienia, zgodnie z rezultatami adekwatnych kwestionariuszy (Ryc. 6).



Ryc. 6. Liczba leków przyjmowanych przez osoby w zależności od: (A) radzenia sobie ze złożonymi czynnościami dnia codziennego (punkt odcięcia w skali IADL= 24 pkt); (B) obecności objawów depresji (punkt odcięcia w skali GDS-15 =5 pkt); (C) poziomu odczuwanego lęku (punkt odcięcia w skali GAS-10 ustalony na podstawie krzywej ROC); (D) poziomu odżywienia (punkt odcięcia w skali MNA = 15 pkt).

Większą liczbę leków przyjmowali pacjenci, którzy byli leczeni przez dwóch lub więcej lekarzy (Ryc. 7; p<0,001).



Ryc. 7. Liczba przyjmowanych leków w zależności od liczby lekarzy leczących pacjenta.

Pacjenci z BMI > 25,7 kg/m^2 ponad 3 razy częściej niż szczuplejsze osoby przyjmowali leki na nadciśnienie tętnicze (OR=3,12, CI 95% [1,85-5,27]). W tej grupie pacjentów częstsze było także przyjmowanie leków przeciwbólowych (OR=1,54, CI 95% [1,04–2,29]). Stosowanie leków przeciwbólowych zwiększane było też przez fakt doświadczania lęku oraz izolacji społecznej (odpowiednio OR=2,59, CI 95% [1,58-4,26] oraz OR=2,08, CI 95% [1,38-3,13]).

Z większą masą ciała związane było częstsze stosowanie diuretyków (ponad 2,5 razy częstsze w grupie osób z masą ciała powyżej 73 kg; OR=2,52, CI 95% [1,21-5,26]) oraz antykoagulantów (ponad 2 razy częstsze u osób z masą ciała > 81 kg; OR=2,16, CI 95% [1,09-4,27]).

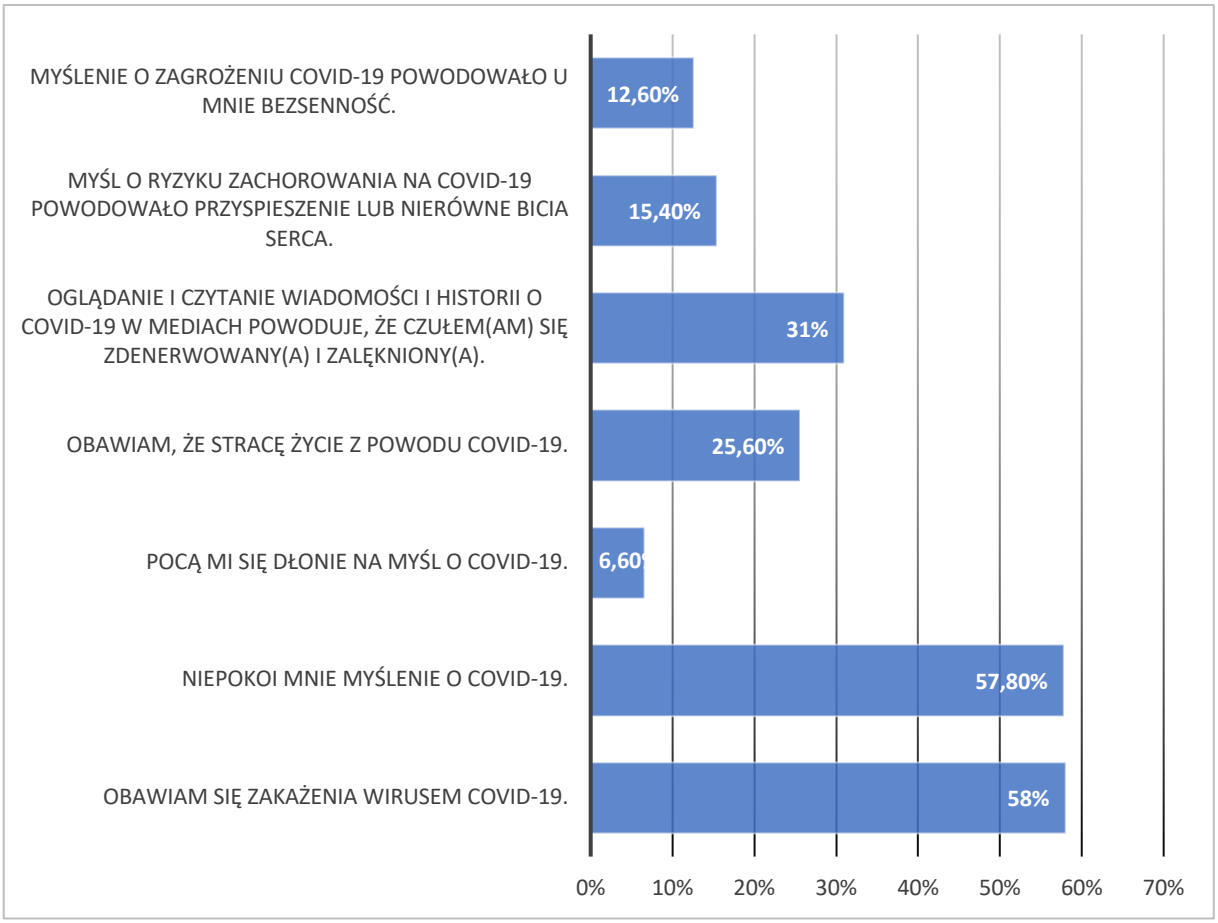
Leki przeciwdepresyjne przyjmowane były częściej przez osoby mieszkające w mieście z liczbą ludności powyżej 400 tysięcy (OR=2,18, CI 95% [1,20-3,94]) oraz z gorszym stanem odżywienia (OR=2,64, CI 95% [1,54-4,53]).

3. The assessment of fear of COVID-19 among the elderly population: a cross-sectional study

W badaniach opisanych w tej publikacji za cel postawiono określenie poziomu lęku przed COVID-19 w populacji osób ≥ 60. roku życia oraz zidentyfikowanie subpopulacji narażonych na największe ryzyko jego odczuwania.

Badanie objęło 500 osób ≥ 60 lat, mieszkających w Polsce. Grupa badana została opisana we wcześniejszych rozdziałach dysertacji.

Wyniki przedstawione w omawianym artykule wskazują, że 58% osób z badanej populacji odczuwało lęk z powodu pandemii COVID-19, a 17,8% określało lęk jako bardzo nasilony. Często zgłaszanymi objawami było uczucie lęku podczas oglądania i słuchania wiadomości dotyczących pandemii (31%) oraz obawa o utratę życia w następstwie zachorowania (25,6%). Ponad 12% respondentów zgłaszało bezsenność, której występowanie wiązali z ówczesną sytuacją epidemiologiczną. Powyższe dane prezentuje Wykres 1.



Wykres 1. Osoby zgadzające się ze stwierdzeniami z kwestionariusza FCV-19S.

Najwyższego poziomu lęku doświadczały kobiety (p=0,025), osoby przyjmujące antykoagulanty (p=0,004) oraz pacjenci leczący się z powodu chorób przewlekłych: choroby niedokrwiennej serca (p<0,001), POChP (p=0,007), niewydolności serca (p<0,001) oraz osoby stosujące leki kardiologiczne (p<0,001), przeciwbólowe (p<0,001), gastroenterologiczne (p=0,005) i przeciwdepresyjne (p<0,043).

Pacjenci z wyższym poziomem lęku określanym za pomocą skali GAS-10 byli także bardziej podatni na odczuwanie lęku związanego konkretnie z infekcją COVID-19.

DYSKUSJA

Badania opisane w cyklu trzech opublikowanych artykułów, stanowiącym rozprawę doktorską, objęły zagadnienia stwarzające istotne problemy kliniczne i często napotykane podczas sprawowania opieki medycznej nad pacjentem w wieku geriatrycznym. Przeanalizowane zostały takie zagadnienia, jak poddawanie się zalecanym szczepieniom ochronnym (w tym przypadku przeciw grypie), rozpowszechnienie stosowania farmaceutyków i ryzyko występowania polifarmakoterapii oraz doświadczanie przez seniorów uczucia lęku.

Osoby w starszym wieku są bardziej podatne na doświadczenie ciężkiego przebiegu grypy oraz rozwoju powikłań w jej przebiegu [7]. Zgodnie z wynikami pracy Canaday'a, jednojądrzaste komórki krwi obwodowej osób w wieku podeszłym produkują mniej interferonu alfa w odpowiedzi na ekspozycję na wirusa grypy, w porównaniu z osobami młodszymi [21], co może stanowić patomechanizm tego zjawiska. Osoby zaszczepione przeciw grypie mają mniejsze ryzyko zgonu oraz hospitalizacji związanych z przebiegiem tej infekcji [22]. Ponadto liczne publikacje wskazują, że stosowanie szczepień przeciw grypie w populacji w wieku powyżej 65. roku życia związane jest także z dodatkowymi korzyściami – istotnie statystycznie niższym ryzykiem rozwoju demencji, w tym choroby Alzheimera [23-25], jak również redukcją ryzyka wystąpienia zdarzeń sercowo–naczyniowych u pacjentów z chorobą niedokrwienną serca [26].

Dzięki przeprowadzonym badaniom ustalono, że poziom wyszczepienia przeciw grypie populacji osób w wieku podeszłym w Polsce wynosił w latach 2019 oraz 2020 odpowiednio 12,4% oraz 10,2%. Są to dane zgodne z innymi raportami prezentującymi statystyki dotyczące rozpowszechnienia szczepień przeciw grypie [27-28]. Przyczynami tak niskiego zainteresowania szczepieniami były głównie lęk przed możliwymi działaniami niepożądanymi (164/500; 32,8%) oraz brak dostępność szczepionek w aptekach (104/500; 20,8%). Prawie połowa badanych osób nie wiedziała o możliwości skorzystania przez seniorów z refundacji przy zakupie szczepionki (241/500; 48,2%). Podkreśla to potrzebę informowania pacjentów o takich udogodnieniach, jak również, ze względu na dużą skalę zjawiska, tworzenia ogólnokrajowych kampanii informacyjnych, w tym także dotyczących refundacji kosztów szczepionek.

Zgodnie z wynikami badań, głównym czynnikiem ograniczającym gotowość do przyjęcia szczepionki przeciw grypie był dochód na osobę w gospodarstwie domowym poniżej 3000 PLN (OR 2,37; CI 95% [1,26 – 4,47]). Wynik ten jest spójny z rezultatami innych badań,

które wykazały, że lepsza sytuacja ekonomiczna sprzyja podjęciu decyzji o poddawaniu się szczepieniom [29-31].

Chęć zaszczepienia się przeciw grypie zwiększał także dodatni wywiad w kierunku przewlekłej obturacyjnej choroby płuc. Obecność chorób przewlekłych, w tym POChP, jest czynnikiem wpływającym mobilizująco na chęć otrzymania szczepienia przeciw grypie także w innych przeprowadzonych do tej pory badaniach [32-35]. W piśmiennictwie można odnaleźć także dane wskazujące na wyższy poziom wyszczepienia wśród osób, które nie mieszkają same [36], seniorów starszych [34-35] oraz posiadających wyższe wykształcenie [34]. Jednak przytoczone spostrzeżenia innych autorów nie znalazły potwierdzenia w przeprowadzonym przez nas badaniu.

Nadmierna farmakoterapia jest również istotnym problemem w populacji osób starszych. W badaniach Sarafaq i wsp. zostało wykazane, że seniorzy wypisywani ze szpitala do domów opieki po nieplanowanej hospitalizacji mieli zalecanych do regularnego stosowania średnio 14 leków, z których 1/3 miała potencjał wywoływania działań niepożądanych, nasilających objawy związane z wielkimi zespołami geriatrycznym [37]. Z kolei raport Biostat wskazuje, że w roku 2019 ponad 82% Polaków kupowało leki na receptę dla siebie lub swoich bliskich. Preparaty dostępne bez recepty kupowało aż 94,6% badanych [38]. W badanej przez nas grupie respondentów wszyscy seniorzy przyjmowali codziennie przynajmniej jeden lek, a większość z nich deklarowała stosowanie 1–3 preparatów dziennie (301/50; 60,2%). Więcej farmaceutyków przyjmowały osoby leczone przez dwóch i więcej lekarzy. Dostępne badania wskazują, że pozostawanie pod opieką więcej niż jednego lekarza związane jest z wyższym ryzykiem stosowania nadmiernej i niepotrzebnej farmakoterapii [39], jak również występowania interakcji między lekami oraz działań niepożądanych [40-41].

Jak udowodniono w badaniach własnych, aż 21,8% osób przyznało, że nie informuje swojego lekarza rodzinnego lub innego lekarza prowadzącego o nowych preparatach włączanych do terapii. Wynika z tego konieczność podejmowania bardziej aktywnych działań w celu uzyskania takich informacji. Istnieją narzędzia, które mogą wspomóc lekarzy klinicystów w kompleksowym spojrzeniu na zagadnienie farmakoterapii w wieku podeszłym i w konsekwencji pomóc ustalić schorzenia mające największy priorytet leczenia oraz zoptymalizować stosowany schemat farmakoterapii, np. włączyć do terapii potencjalnie pominięte leki (PPOs) oraz usunąć leki potencjalnie nieodpowiednie (PIMs). Do wspomnianych metod należy między innymi Całościowa Ocena Geriatryczna (COG), czy kryteria The Beers, STOPP i START. Bazując na wynikach otrzymanych w pracy

Whitmana i wsp., przy zastosowaniu oceny stanu zdrowia i włączonej farmakoterapii u pacjentów onkologicznych w wieku podeszłym przy użyciu trzech ostatnich narzędzi, zidentyfikowanych i wykluczonych ze stosowania zostało 73% PIMs, co spowodowało ustąpienie zgłaszanych niepożądanych objawów ubocznych u około 65% pacjentów [42-45].

W naszej pracy zaobserwowaliśmy, że pacjenci z większą masą ciała oraz wyższą wartością BMI (>25,9 kg/m^2) stosowali więcej leków (OR=2,68, CI 95% [1,50–4,77]). Jest to logiczna zależność, ponieważ nadmierna masa ciała znacząco zwiększa ryzyko występowania chorób przewlekłych oraz szybszego zgonu [46]. Stosowaniu większej liczby leków sprzyjało także uzyskiwanie w adekwatnych kwestionariuszach wyników świadczących o występowaniu objawów depresji oraz wyższego poziomu lęku. Ponadto, pacjenci wykazujący wyższy poziom lęku i izolacji społecznej przyjmowali więcej leków przeciwbólowych (odpowiednio: OR=2,59, CI 95% [1,58 – 4,26] oraz OR=2,08, CI 95% [1,38 – 3,13]).

Częstość występowania objawów depresyjnych w populacji osób starszych w naszym badaniu jest wyższa niż w podobnych, publikowanych wcześniej badaniach [47-48], co może mieć związek z trwającą wówczas pandemią COVID-19. Wysoki poziom lęku przed zakażeniem COVID-19 mógł powodować izolację społeczną osób starszych, nasilać objawy depresji, a nawet powodować rezygnację z korzystania ze świadczeń medycznych [49-50]. Lęku związanego z ówczesną sytuacją epidemiologiczną doświadczało 58% osób objętych badaniem, z dominacją kobiet (p=0,025), pacjentów przyjmujący antykoagulanty (0=0,004) i osób leczących się z powodu chorób przewlekłych. Wyniki naszych badań są zgodne z wynikami uzyskanymi w podobnych publikacjach. Na częstsze doświadczanie stresu, niepokoju czy objawów depresji z powodu potencjalnej infekcji COVID-19 przez kobiety wskazuje także kilka innych pozycji piśmiennictwa [51-53]. Kobiety w trakcie pandemii częściej korzystały z opieki psychologicznej [54-55], natomiast Hosen i współpracownicy w swoim badaniu wykazali, że wykazywały także większe podporządkowanie się do stosowania zalecanych środków ochrony osobistej oraz nakazu izolacji [56].

Fakt występowania wyższego poziomu lęku związanego z COVID-19 u pacjentów z chorobami przewlekłymi również znajduje potwierdzenie w innych pracach [57-58]. Infekcja wirusem SARS-CoV-2 może prowadzić do powstania powikłań zakrzepowych, wiodących do wystąpienia udaru mózgu, niedokrwienia mięśnia sercowego czy zatorowości płucnej [59]. Informacje te były przekazywane w mediach w trakcie trwania pandemii, co uzasadnia wyższy poziom lęku wśród osób przyjmujących antykoagulanty.

Podsumowując, w naszych badaniach wykazano, iż poziom wyszczepienia populacji geriatrycznej przeciw grypie w latach ubiegłych był niski i wynosił w latach 2019 i 2020 odpowiednio 12,4% oraz 10,2%. Obawy o bezpieczeństwo szczepionek, niski status ekonomiczny i utrudniona dostępność okazały się stanowić główne przyczyny niechęci do stosowania szczepień. Powyższe obserwacje wskazują istotną przestrzeń do poprawy w zakresie edukacji społecznej na temat szczepień, zwłaszcza w grupach podwyższonego ryzyka ciężkiego przebiegu chorób infekcyjnych. Konieczne jest także zapewnienie łatwego dostępu do szczepionek (np. w przychodniach POZ), co wymaga podjęcia skoordynowanych działań przez decydentów i pracowników ochrony zdrowia. Wdrożenie skutecznych metod profilaktyki chorób infekcyjnych pozwoli na poprawę stanu zdrowia populacji geriatrycznej oraz przyczyni się do zmniejszenia obciążenia systemu ochrony zdrowia oraz kosztów leczenia.

Zidentyfikowanie grup osób w podeszłym wieku szczególnie podatnych na doświadczanie lęku związanego z sytuacją epidemiologiczną, spowodowanego pandemią COVID-19, może pomóc ukierunkować uwagę środowiska lekarskiego i zintensyfikować badania skriningowe pod kątem występowania problemów ze zdrowiem psychicznym wobec narażenia na zagrożenia zdrowotne w najbardziej wrażliwych subpopulacjach geriatrycznych.

Jak wykazano, doświadczanie lęku, izolacji społecznej czy objawów depresyjnych związane jest ze wzrostem liczby przyjmowanych leków, co jest zjawiskiem niepożądanym szczególnie w grupie pacjentów w wieku podeszłym. Wzrasta wśród nich również częstość przyjmowania m.in. leków przeciwbólowych, a wiele preparatów stosowanych w leczeniu bólu dostępnych jest bez recepty, przez co są łatwo dostępne dla pacjentów. Niejednokrotnie są to substancje mające istotne, zwłaszcza w wieku podeszłym, działania niepożądane i wymagają indywidualnego dostosowania dawki w zależności od stanu zdrowia i parametrów klinicznych. Preparaty NLPZ wchodzą w liczne interakcje z lekami, które pacjenci mogą otrzymywać od lekarza na receptę. Jako że aż 21,8% osób z grupy badanej nie informowała swojego lekarza rodzinnego o nowych lekach włączonych do terapii, podkreślenia wymaga konieczność aktywnego dopytywania pacjentów o wszystkie aktualnie stosowane leki.

Ze stosowaniem większej liczby leków w populacji objętej badaniem związana była także większa masa ciała i wyższe wartości BMI, co podkreśla konieczność prowadzenia kampanii edukacyjnych oraz rozmów indywidualnych, skierowanych także do osób w późniejszych etapach życia, które dotyczyć będą zdrowego stylu odżywiania, aktywności fizycznej oraz skutecznego leczenia nadwagi i otyłości. Oczywiście wdrożenie takich działań prewencyjnych już od najmłodszych grup wiekowych będzie w konsekwencji procentowało w przyszłości wyższym poziomem zdrowia u seniorów.

Przedstawione wyniki badań mogą stanowić przyczynek do zwrócenia baczniejszej uwagi na ważne aspekty stanu psychofizycznego populacji geriatrycznej zarówno przez lekarzy sprawujących bezpośrednią opiekę nad starszymi pacjentami, jak również decydentów systemu ochrony zdrowia. Poczynione obserwacje wykazują potencjał, by przyczynić się do poprawy jakości sprawowanej opieki medycznej, udoskonalenia kampanii edukacyjnych oraz wdrożenia stosownych rozwiązań prawnych.

WNIOSKI

1. W Polsce poziom wyszczepienia populacji geriatrycznej przeciw grypie w ostatnich latach był bardzo niski, a niechęć do poddania się szczepieniu wynikała głównie z nieufności co do bezpieczeństwa szczepionek i ich ograniczonej dostępności, jak również sytuacji ekonomicznej seniorów, lęku przed COVID-19 i braku wiedzy o możliwości refundacji kosztów. Wskazane jest zatem zintensyfikowanie kampanii edukacyjno - informacyjnych oraz działań ułatwiających dostęp osób starszych zarówno do zakupu szczepionek, jak i ich podania.

2. Pandemia COVID-19 spowodowała u starszych osób, częściej kobiet i przewlekle chorych, nasilenie zaburzeń lękowych i depresyjnych, co przełożyło się na wzrost izolacji społecznej i rezygnację z korzystania ze świadczeń medycznych, skutkując „długiem popandemicznym".

3. Polifarmakoterapia w populacji senioralnej związana jest głównie z zażywaniem leków hipotensyjnych i przeciwbólowych oraz masowym stosowaniem preparatów OCT, a na jej ryzyko narażeni są bardziej pacjenci prowadzeni przez kilku lekarzy oraz osoby z nadwagą, zaburzeniami lękowo-depresyjnymi i upośledzoną funkcjonalnością. Zasadne jest zwiększenie aktywności lekarzy w zakresie weryfikowania listy leków pacjentów geriatrycznych.

OGRANICZENIA PRACY

Zastosowane w badaniach ankiety i kwestionariusze wypełniane były na podstawie danych zebranych za pośrednictwem rozmów telefonicznych, a współczynnik zwrotu (odpowiedzi) był stosunkowo niski, gdyż wynosił 40%. Ze względu na to, że nie dysponujemy żadnymi danymi dotyczącymi osób, które odmówiły udziału w badaniu, nie jest możliwe określenie, czy między tą grupą a respondentami występowały istotne różnice. Ponadto uczestnicy badania samodzielnie podawali szczegóły na swój temat, co tworzy ryzyko braku obiektywności danych. Przekrojowy charakter badania w pewnym stopniu ogranicza możliwość uogólniania wyników do szerszej populacji. Nie jest również możliwe jednoznaczne określenie przyczynowości zaobserwowanych zależności.

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STRESZCZENIE

Sprawowanie opieki lekarskiej nad pacjentem w wieku podeszłym i starczym wiąże się z licznymi wyzwaniami, które wynikają z odrębności tej populacji w porównaniu do młodszych osób dorosłych. Dane demograficzne wskazują, że osoby powyżej 65. roku życia są najszybciej rosnącą grupą wiekową. Tworzy to potrzebę prowadzenia nowych badań, które dostarczą nam danych poprawiających efektywność sprawowania opieki lekarskiej oraz wdrażania profilaktyki zdrowotnej w populacji geriatrycznej.

Celem badań było określenie wpływu czynników psychofizycznych oraz socjoekonomicznych na zachowania profilaktyczne, farmakoterapię i stan psychiczny osób w wieku 60 i więcej lat. Przekrojowe badanie ankietowe zostało przeprowadzone w listopadzie i grudniu 2020 roku, na reprezentatywnej grupie 500 osób w wieku ≥ 60 lat, mieszkających w Polsce. Wyniki badania zostały przedstawione w trzech pracach oryginalnych, opublikowanych w trzech różnych czasopismach o łącznym współczynniku IF = 14,539.

Wykazano, że głównymi czynnikami wpływającymi pozytywnie na gotowość przyjęcia szczepienia przeciw grypie w populacji osób w wieku podeszłym był dochód oraz obecność chorób przewlekłych: choroby wieńcowej i POChP. Szczepieniu częściej poddawały się osoby, których dochód na osobę w rodzinie przekraczał 3000 PLN (OR=2,37, CI 95% [1,26 – 4,47]). Rezygnacji ze szczepienia sprzyjał wyższy poziom lęku przed COVID-19 (OR=1,65, CI 95% [1,02–2,66]). Lekarze rekomendowali szczepienie przeciw grypie i pneumokokom tylko u 16,2% starszych pacjentów. Najczęściej stosowanymi przez respondentów grupami leków były leki obniżające ciśnienie tętnicze krwi (51%) oraz leki przeciwbólowe (46% pacjentów). O nowych preparatach włączanych do terapii nie informowała swojego lekarza prowadzącego 1/5 badanych (21,8%). Liczba przyjmowanych leków rosła wraz ze wzrostem masy ciała oraz BMI (p<0,001), występowaniem chorób przewlekłych oraz u osób, które były leczone przez dwóch lub więcej lekarzy. Pacjenci doświadczający lęku i izolacji społecznej częściej przyjmowali leki przeciwbólowe (OR=2,59, CI 95% [1,58-4,26] oraz OR=2,08, CI 95% [1,38-3,13]). Spośród badanej populacji, 58% osób odczuwało lęk z powodu pandemii COVID-19. Były to głównie kobiety (p=0,025), osoby przyjmujące antykoagulanty (p=0,004) oraz pacjenci z chorobami przewlekłymi.

Wyniki badań dostarczają cennych informacji zarówno lekarzom sprawującym bezpośrednią opiekę nad pacjentem geriatrycznym, jak również decydentom. Mogą przyczynić się do poprawy jakości sprawowanej opieki medycznej, udoskonalenia kampanii edukacyjnych oraz rozwiązań prawnych.

SUMMARY

Physicians taking care of elderly patients face many challenges resulting from the specificity of the geriatric population compared with younger adults. Demographic data indicate that the fastest growing population are people aged over 65 years. Therefore, there is an emerging need to conduct studies that provide us with possible data improving efficacy of medical care and health prophylaxis in geriatric population.

The aim of the study was to determine the influence of psychophysical as well as socioeconomical factors on preventive behaviors, pharmacotherapy and mental condition in geriatric population. The cross-sectional, questionnaire-based study was carried out in November and December 2020, on a representative nationwide sample of 500 adults over 60 years, living in Poland. Results of the study were presented in the three original articles, published in three different medical journals, with total IF = 14,539.

The study revealed that in the examined population over 60 years, decision to receive an influenza vaccination was influenced positively by net income and the presence of chronic diseases: coronary artery disease and COPD. Seniors with net income over 3000 PLN were more likely to undergone a preventive vaccination (OR=2,37, CI 95% [1,26 – 4,47]). On the other hand, those with strong fear of COVID-19 had significantly higher odds of refraining from influenza vaccination (OR=1,65, CI 95% [1,02 – 2,66]). Influenza and pneumococci vaccination was recommended by GPs only to 81 patients (16,2%). The most commonly used medications in this age group included antihypertensive drugs (51% of patients) and analgesics (46%). One fifth of the respondents (21.8%) did not inform their doctor about new preparations included in the therapy. Drug intake increased with higher body mass and BMI ($p<0,001$), presence of chronic diseases and in seniors treated by two or more doctors. Participants experiencing anxiety or social loneliness took more painkillers (OR=2,59, CI 95% [1,58-4,26] and OR=2,08, CI 95% [1,38-3,13], respectively). In our study, 58% of participants experienced fear due to prevailing COVID-19 pandemic, mostly women ($p=0,025$), patients taking anticoagulants ($p=0,004$), and those with chronic diseases.

The study results can be relevant both for healthcare workers and policy makers. The results may contribute to improving a quality of medical care, educational campaigns, as well as legal solutions.

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Identification of Barriers Limiting the Use of Preventive Vaccinations against Influenza among the Elderly Population: A Cross-Sectional Analysis

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Abstract: Older adults are at a high risk of experiencing severe complications of influenza. Receiving a vaccination is a beneficial strategy to prevent the disease and reduce the severity of influenza illnesses. This cross-sectional questionnaire-based study aimed to evaluate the influence of sociodemographic, clinical, and mental parameters as well as other potential risk factors on refusal to vaccinate against influenza among the elderly population in Poland. Furthermore, due to the prevailing COVID-19 pandemic, we put efforts into finding any statistical correlations between the fear of COVID-19 infection in patients and their attitudes toward receiving an influenza vaccination. The study was conducted in November–December 2020 in Poland on a representative nationwide sample of 500 individuals aged > 60. Of the respondents, 62 (12.4%) and 51 (10.2%) underwent influenza vaccination in 2019 and 2020, respectively. Out of ten different factors analyzed in this study, three were significantly associated with attitudes towards influenza vaccination. Participants with net income below the national average of PLN 3000 (OR = 2.37, CI 95% [1.26–4.47]), compared to those earning more than PLN 3000, had significantly higher odds of having a negative attitude towards influenza vaccination. Furthermore, respondents with <174 cm height (OR = 2.56, CI 95% [1.51–4.33]) and those with strong fear of COVID-19 infection (OR = 1.65, CI95% [1.02–2.66]) were also more likely to refrain from influenza vaccination. We believe the identification of factors limiting the willingness to receive influenza vaccination is an effective way to help clinicians focus their efforts on educating the groups of patients with the highest odds of refusing to receive the vaccine. Moreover, it may aid the design and enforcement of national solutions or the implementation of novel legislative measures and preventive programs, increasing public confidence and promoting vaccination, especially among groups at high risk of developing this disease.

Keywords: influenza; sociodemographic factors; elderly; vaccination

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1. Introduction

Influenza is a common infectious disease that circulates seasonally in all parts of the world and occasionally causes pandemics. Seasonal influenza alone leads to an estimated 3 to 5 million cases of severe illness and about 250,000 to 500,000 deaths globally each year [1]. In general, the influenza virus attacks mainly the upper respiratory tract, and the disease is characterized by fever, cough, headache, muscle and joint pain, malaise, sore throat, and a runny nose [2–4]. However, older adults, pregnant women, and those

with underlying health conditions are more vulnerable to developing severe complications, including cardiovascular events, exacerbations of chronic underlying conditions, increased susceptibility to secondary bacterial infections, functional decline, and poor pregnancy outcomes [4]. The most effective strategy to prevent influenza and lower the severity of the disease is vaccination. Due to the antigenic drift of influenza viruses, the World Health Organization (WHO) recommends that this vaccination be performed annually. Depending on the local disease burden, available resources, and capacity, each country's ministry of health implements its own decisions on administering influenza vaccines [1]. In 2020, influenza vaccination coverage rates (IVCRs) ranged from 5.9% of the elderly population > 65 years in Turkey to almost 89% in South Korea [5]. However, as shown by del Riccio et al., the prevailing COVID-19 pandemic has influenced the global IVCRs among the elderly population. During the first post-pandemic winter, in 2020/2021, a significant increase in IVRs was observed (in descending order) in Spain (+13.0%), Italy (+10.7%), England (+8.5%), Israel (+8.4%), France (+7.9%), the Netherlands, (+6.6%), and the United States (US) (+5.4%), compared with 2019/2020 [6]. Taking into account reports from Poland, between 2019 and 2020, only 4.1% of the population at all ages was influenza vaccinated [7]. Considering seniors, the level of vaccination in the age group > 65 years was 15.1% in 2019/2020 [8]; in winter 2020/2021, there was an IVR increase of 3.3% [6]. Nevertheless, these statistical data raise questions about possible barriers discouraging people from being influenza-vaccinated. Understanding these barriers is crucial, as it reveals the complexity of the situation and increases the levels of compliance with vaccination recommendations among older adults.

A large number of diverse reasons for low vaccine uptake by the elderly population have been addressed in the literature; these include fear of side-effects or associated illness from the vaccines, lack of confidence in the effectiveness of the vaccine, fear of needles, disbelief in the seriousness of flu, inconvenience (increased financial costs of vaccine, decreased frequency of interaction with healthcare service), and personal susceptibility [9–14]. As shown in several independent studies, although perceiving the same side effects in groups receiving the influenza vaccines and a placebo (e.g., fatigue, myalgias, headaches, and fever or chills), the vaccine hesitancy still existed [10–12]. Furthermore, in China, Yan et al. conducted a cross-sectional survey in 11,052 respondents to determine factors and barriers of influenza vaccination. The study group was divided into three categories depending on age: children < 15 years of age, adults between 15 and 60 years of age, and older adults $\geq$ 60 years of age. In all age groups, the most common reasons cited by respondents for being unvaccinated were worrying about the side effects, believing they were healthy and did not need to be vaccinated, and lack of influenza vaccine awareness [13]. These results are consistent with a study by Trent et al., who reported that the most common barriers to influenza vaccination were as follows: believing the vaccine could give you influenza, believing the vaccine could make you ill afterward, and preferring to develop immunity "naturally" [14]. Interestingly, as shown by Nicholls et al., the best explanations by older people for not receiving an influenza vaccination were psychosocial factors. Depending on their age, each individual perceives a diverse type of health self-control, conscientiousness, and risk perceptions/avoidance. In addition, difficulties in daily functioning, as well as a decline in cognition, are significant factors that make it more difficult for older adults to access vaccinations [15]. Net income, influenza vaccine reimbursements implemented by national governments, as well as knowledge of the vaccine seem to also play a crucial role in the willingness to receive the vaccine. Medical consultations with primary health professionals play a significant role as predictors influencing decisions to undergo vaccination. Therefore, it is crucial to improve patient–doctor interrelations to clearly explain the potential risks of not receiving an immunization, especially in the elderly population, and decrease possible confusion.

To date, most of the studies aimed at assessing attitudes towards influenza vaccination in Poland have been carried out among patients with chronic medical conditions or those with high exposure to influenza, including healthcare professionals or medical

students [16–19]. Data concerning the approach to vaccination among older people are scarce. Furthermore, to the best of our knowledge, no studies from Poland have identified the impact of the fear of the prevailing COVID-19 pandemic on attitudes toward influenza vaccination. This important topic has been documented in other countries but requires further investigation due to conflicting results [20,21]. Identifying factors that increase or decrease attitudes favoring vaccination seems to be a promising way to foster confidence in vaccination and enhance the coverage of vaccination rates, which is extremely important for individuals with the highest risk of developing influenza-related complications.

This study sought to evaluate the influence of sociodemographic, clinical, and mental parameters, as well as other potential risk factors on refusal to vaccinate against influenza among the elderly population. The aim was to create a model that may identify the most skeptical groups in relation to vaccinations in the analyzed population. Furthermore, we focused efforts into answering the question of whether the fear of the prevailing COVID-19 pandemic has influenced the willingness to receive influenza vaccinations among members of the elderly population in Poland. We believe that this study is a way to identify and create measures by which we may increase influenza vaccination coverage rates in one of the most vulnerable subpopulations.

2. Materials and Methods

2.1. Study Design

The survey was conducted in November–December 2020 in a group of 500 elderly people, including 290 women (58%) and 210 men (42%), aged 60 or more (median = 68, IQR = 62–72). The data were generated on the basis of questionnaires completed during recorded telephone calls. The response rate was 40%. A stratified sampling per the demographic structure was used to obtain a representative sample of the elderly respondents. The proper size of the sample was calculated using the following formula:

$$\text{Sample size} = \frac{Z_{1-a/2}{}^2 p(1-p)}{d^2}$$

where:

$Z_{1-a/2}$ is the standard normal variate (at 5% type 1 error $p < 0.05$), -1.96;
p is the expected prevalence obtained from a pilot study, -0.4; and d is the absolute precision, -0.04.

Target quotas were set for gender and age strata in each geographic region in Poland. All respondents were precisely interviewed; all interviewers were adequately trained. A data collection supervisor supervised all interviews, and a study coordinator randomly evaluated the dialogue recordings. The transcripts were not returned to participants for comment and/or correction, nor were repeat interviews carried out. The interviews lasted maximally 20 min. All participants agreed to participate in the study, and they were informed about the goal of this survey. No compensation was provided for participating in the study. More details on the study design are presented in the previously published articles [22,23]. The study was approved by the Bioethics Committee of Wroclaw Medical University.

2.2. Explanatory Variables

To assess the attitudes of seniors toward receiving preventive influenza vaccinations, all respondents were asked to answer questions from four categories: (1) sociodemographic data, (2) co-existing comorbidities, (3) mental conditions and mentally related behaviors, and (4) detailed questions about receiving or rejecting influenza vaccination. When analyzing sociodemographic factors, the variables included (1) gender (male or female), (2) age (categorized as 60–64; 65–69; 70 and more), (3) place of residence (city over 20,000 residents and village or city less than 20,000 residents), (4) household situation (living with or without child/children), (5) level of education (primary, secondary, or higher), (6), body

weight (<76 kg or >76 kg), (7) body height (<174 cm or >174 cm), (8) BMI (<27 kg/m^2 or >27 kg/m^2), (9) net income per person in the household per month (in Polish currency: PLN; <PLN 3000 or >PLN 3000), and satisfaction with the specialist medical care (SMC) received in relation to the disease (<6 pts or >6 pts). The sociodemographic data of all respondents are shown in Table S1. Co-existing comorbidities that were present in the evaluated population included coronary heart disease, diabetes mellitus, asthma, COPD, heart failure, kidney failure, and physician-diagnosed gastroesophageal reflux disease (GERD) (Table S2). The third category was aimed at analyzing the functional and mental condition of the respondents using well-established and validated scales such as (1) Activities of Daily Living Scale (ADL), (2) the Lawton Instrumental Activities of Daily Living Scale (IADL), (3) Abbreviated Mental Test Score (AMTS), (4) Geriatric Depression Scale (GDS-15), (5) Geriatric Anxiety Scale (GAS-10), (6) Lubben Social Network Scale (LSNS-6), (7) Social Loneliness Scale (Gierveld Scale), and (8) Mini Nutritional Assessment (MNA) (Table S3). Furthermore, to assess the fear of COVID-19 infection, we used the "Fear of COVID-19 Scale" (FCV-19S) (Table S4a). In addition, respondents were asked if they received influenza vaccination in 2019 and 2020 and which factors impacted making such decisions, including a recommendation from a GP doctor and/or knowledge about influenza vaccine reimbursement for seniors.

2.3. Measures

The proprietary tool "Scale of fear of COVID-19 infection" was used to assess the fear of COVID-19 in the senior population. The answers to the survey questions are presented in Table S4a. Participants stated their position in 116 questionnaires using a five-point Likert scale (ranging from "1 = strongly disagree" and "3 = neither agree nor disagree" to "5 = strongly agree"). Hence, the cumulative score ranged from 7 to 35, where the higher the score, the greater the fear of COVID-19. The COVID-19 fear scale has been validated to assess the reliability of the item (Table S4b). The homogeneity of the items as assessed by the Cronbach's Alpha index was $\alpha = 0.88$ and was satisfactory (above the minimum acceptable value of 0.6) (Table S4b).

2.4. Statistical Analysis

Nominal qualitative (e.g., gender) and ordinal (e.g., age group) variables are presented in multi-way tables in the form of frequency (n) and proportion (%). Quantitative variables (e.g., BMI) with a distribution close to normal are presented in tables and graphs in the form of means and standard deviations (M $\pm$ SD), and in cases where their distribution differed significantly from normal (which was verified by the Kolmogorov Smirnov test)—in forms of medians and quartile ranges—Me (Q1–Q3). Chi-square tests of independence were used to assess the significance of the correlation between the two qualitative variables. The significance of differences between the average values of quantitative variables in the two groups was assessed using the Mann–Whitney test. Differences were considered statistically significant if the p-value was less than or equal to 0.05. Spearman's rank correlation coefficient (Rho) was used to assess the significance of the mutual relations between two variables. Continuous or step quantitative parameters were transformed into dichotomous variables, and ROC curves and Youden indices were used to determine the cut-off values. For the established threshold values, the sensitivity and specificity were estimated. Univariate and multivariate logistic regression analyses were used to establish independent factors affecting the negative attitudes towards vaccination and eliminate their potential interrelation. For univariate logistic regression, the number (proportion) of patients in the groups differing in rates of vaccination, the result of the independence test (p-value of the chi-square test), and the values of the odds ratio and their 95% confidence intervals are given. In the case of multivariate logistic regression, the values of the beta logistic regression coefficients and the odds ratios with 95% confidence intervals were estimated. The calculations were performed with Statistica v.13.3 (TIBCO Software Inc., Palo Alto, CA, USA).

3. Results

3.1. Participants' Characteristics

The cross-sectional analysis included 500 patients (290 female, 58% and 210 male, 42%) aged 60 or more (mean M = 67.9 ± 4.2). Most of them lived in a city with over 20,000 residents (334/500; 66.8%), more often with children (354/500; 70.8%). More respondents were less than 174 cm tall. Furthermore, based on the given measurements of body weight and height, we calculated the body-mass index (BMI) of all participants; 286 of them had BMI < 27 kg/m^2 (286/500; 57.2%). Moreover, 390 participants earned less than PLN 3000 per person per month (390/500; 78.0%). In addition, many participants were dissatisfied with the specialist medical care (171/500; 34.2%). Detailed data on the general characteristics of the surveyed people showing their sociodemographic data are presented in Table S1. Most of the participants suffered from one or more chronic diseases such as coronary heart disease (n = 63, 12.6%), diabetes mellitus (n = 74, 14.8%), asthma (n = 43, 8.6%), COPD (n = 33, 6.6%), heart failure (n = 71, 14.2%), kidney failure (n = 20, 4.0%) and gastroesophageal reflux disease (n = 68, 13.6%) (Table S2). Considering the mental conditions of surveyed seniors, most of them were fit (493/500; 98.6%). However, according to the GDS-5 scale, a significant number of patients suffered from depression (176/500, 35.2%). They exhibited less social engagement (according to the LSNS-6 scale) and felt lonely (according to the Gierveld Scale). Most of the participants had proper nutritional status (according to the MNA scale). Detailed data on the functional and mental characteristics of the studied patients are presented in Table S3.

3.2. Sociodemographic, Clinical and Mental Factors Have an Impact on Attitudes toward Preventive Influenza Vaccination

From a total of 500 respondents, only 62 (12.4%) and 51 (10.2%) of them underwent influenza vaccination in 2019 and 2020, respectively. The reasons for such low interest in vaccination were the fear of possible complications (n = 164, 32.8%) and lack of availability of vaccines in pharmacies (n = 104, 20.8%). Moreover, primary healthcare physicians recommended vaccination against influenza and pneumococci only in 81 (16.2%) patients. Furthermore, 259 patients knew about influenza vaccine reimbursement for seniors (259/500; 51.8%) (Table S5).

We used the Spearman's rank correlation coefficients to identify potential correlations between sociodemographic, clinical, functional, and mental characteristics with the parameters characterizing attitudes toward preventive vaccinations among the studied seniors (Table 1). Including sociodemographic factors, net income was crucial in deciding whether to receive a vaccination or not. Interestingly, the patient's height seemed to have a significant impact on their attitude toward preventive vaccination. Among functional conditions, we noticed a statistically significant correlation between performing complex activities of daily living (according to the IADL scale) and nutritional status (according to the MNA scale) with attitudes toward vaccination. Patients with lower nutritional status were vaccinated more often. In addition, the incidence of chronic diseases including coronary artery disease, diabetes, asthma, heart failure, and GERD were of great importance. Surprisingly, patients with these disorders were more likely to drop out of influenza or pneumococcal vaccination.

Table 1. Values of Spearman's rank correlation coefficients (Rho) between the analyzed sociodemographic, clinical, and mental factors and attitudes toward preventive vaccination in the group of 500 seniors.

Variable	Attitude toward Vaccination					
	A	**B**	**C**	**D**	**E**	**F**
Gender (1—women, 0—man)	−0.024	0.032	0.025	−0.053	−0.066	−0.024
Age (years)	−0.008	−0.080	−0.023	0.013	0.009	−0.008
Number of inhabitants in the place of residence	0.055	0.023	−0.007	0.098	−0.007	0.055
Number of household members	0.020	−0.015	−0.026	0.004	0.080	0.020
Level of education (1—basic, . . . , 4—higher)	−0.021	0.034	−0.011	0.017	−0.047	−0.021
Income (PLN)	0.186	0.165	−0.108	0.041	0.100	0.179
Body weight (kg)	0.034	−0.003	−0.053	0.043	0.051	0.034
Body height (cm)	0.068	−0.007	−0.111	0.101	0.080	0.053
BMI (kg/m^2)	−0.009	0.003	0.014	−0.012	0.009	−0.009
Satisfaction with medical care (0–10)	0.021	−0.011	−0.085	0.087	0.092	0.048
ADL (pts)	−0.043	−0.038	0.042	0.012	0.027	−0.043
IADL (pts)	−0.082	−0.058	0.014	−0.047	−0.178	−0.082
AMTS (pts)	0.044	0.003	−0.064	0.070	0.023	0.044
GDS-15 (pts)	−0.068	−0.021	0.041	−0.011	0.049	−0.068
GAS-10 (pts)	0.004	0.061	0.021	−0.024	0.082	0.004
LSNS-6 (pts)	0.033	−0.031	0.001	0.043	−0.030	0.033
GLS (pts)	−0.063	−0.081	−0.017	−0.024	−0.094	−0.063
MNA (pts)	−0.041	−0.097	0.043	0.045	−0.123	−0.041
Fear of COVID-19 (pts)	0.056	0.062	0.070	0.134	0.168	−0.022
Coronary artery disease	0.095	0.071	0.017	0.088	0.160	0.095
Diabetes	0.014	0.008	0.057	−0.075	0.107	0.014
Asthma	0.014	0.085	0.074	−0.017	0.117	0.014
COPD	0.022	−0.010	−0.048	0.181	0.080	0.022
Heart failure	0.038	0.033	0.009	0.060	0.194	0.038
Kidney failure	−0.015	−0.001	0.075	−0.054	−0.034	−0.015
GERD	0.045	0.040	0.009	0.070	0.158	0.044

A—vaccinated against influenza in 2019, B—vaccinated against influenza in 2020, C—avoids vaccination due to possible complications, D—wants to be vaccinated against the flu, but this is difficult due to the lack of a vaccine in pharmacies, E—primary care physician recommended influenza and pneumococcal vaccination, F—aware of influenza vaccine reimbursement for seniors. Significant Spearman's rank correlation coefficients (rho) are marked in red color.

3.3. Net Income

Considering sociodemographic data, the only factor influencing the decision to receive a preventive vaccination turned out to be net income. Seniors who were vaccinated against influenza in 2019 (Figure 1A) and 2020 (Figure 1B) had significantly higher net income ($p < 0.001$). Simultaneously, people whose primary healthcare physician recommended vaccination against influenza and pneumococci and those who knew about influenza vaccine reimbursement for seniors also had higher net income ($p = 0.013$, Figure 1C and $p < 0.001$, Figure 1D, respectively). In contrast, people who were afraid of being vaccinated due to potential complications had significantly lower net income ($p = 0.004$, Figure 1E).

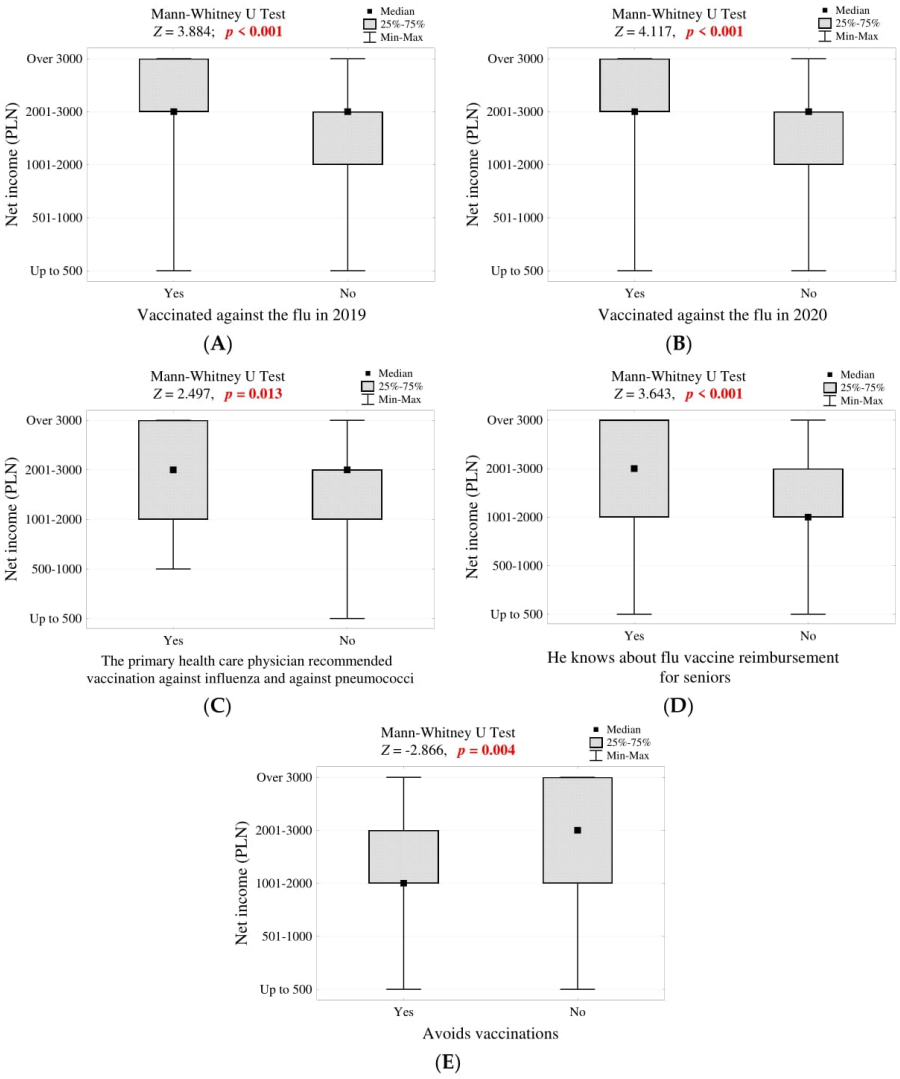

Figure 1. (**A**) Monthly net income per person in the household among groups differing in influenza vaccination in 2019; (**B**) Monthly net income per person in the household among groups differing in influenza vaccination in 2020; (**C**) Monthly net income per person in the household among groups of people with or without a recommendation from a primary care physician for influenza and pneumococcal vaccination; (**D**) Monthly net income per person in the household among groups of people who differ in the knowledge of influenza vaccine reimbursement for seniors; (**E**) Monthly net income per person in households that differ in influenza vaccination avoidance due to possible complications, and the significance test results.

3.4. Mental Health Conditions

Considering functional conditions, nutritional status (as shown in the MNA scale) and performing complex activities (as shown in the IADL scale) play a role in shaping attitudes

toward preventive vaccinations. Seniors who were vaccinated against influenza in 2020 had a slightly worse nutritional status (the difference was borderline significant; $p = 0.062$, Figure 2A). This correlation was also observed among people whose primary healthcare physician recommended vaccination against influenza and pneumococci ($p = 0.008$, Figure 2B). In addition, these respondents had lower scores for complex activities of daily living ($p = 0.001$, Figure 2C).

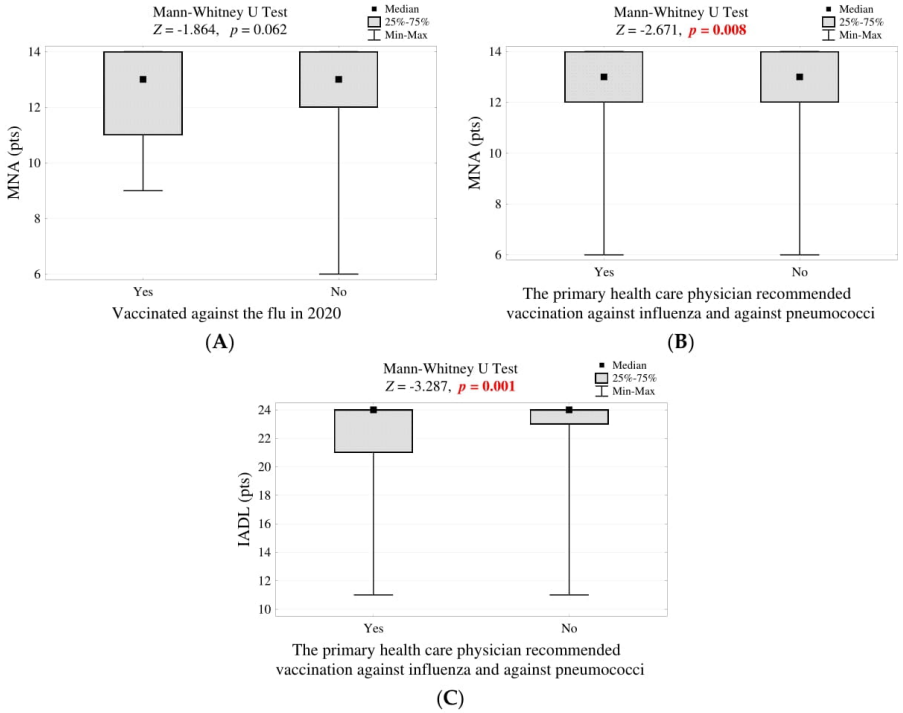

Figure 2. (**A**) Nutritional status in groups of people that differed in influenza vaccination in 2020 and the result of the significance test; (**B**) Assessment of the nutritional status in groups of people who were recommended or not by a primary healthcare physician for influenza and pneumococcal vaccination, and the test of significance; (**C**) Assessment of complex activities of everyday life in groups of people who were recommended or not by a primary healthcare physician to vaccinate against influenza and pneumococci, and the result of the significance test.

3.5. Chronic Diseases

The occurrence of chronic diseases seems to play an important role in shaping attitudes toward preventive vaccinations. Seniors vaccinated against influenza in 2019 more frequently had coronary artery disease (20.6% vs. 11.2%; $p = 0.033$, Figure 3A). This disease was also more often observed among people whose primary healthcare physician recommended vaccination against influenza and pneumococci and those who knew about the influenza vaccine reimbursement program for seniors (31.8% vs. 14.0%; $p < 0.001$, Figure 3B and 65.1% vs. 49.9%; $p = 0.034$, Figure 3C). Furthermore, people whose primary healthcare physician recommended vaccination against influenza and pneumococci were more likely than others to have diabetes, asthma, and heart failure (25.7% vs. 14.5%; $p = 0.026$, Figure 3D; 30.2% vs. 14.9%; $p = 0.017$, Figure 3E, and 33.8% vs. 13.3%; $p < 0.001$, Figure 3F). In addition, patients with COPD were significantly more likely than others to want vaccination against influenza (48.5% vs. 18.8%, $p < 0.001$, Figure 3G).

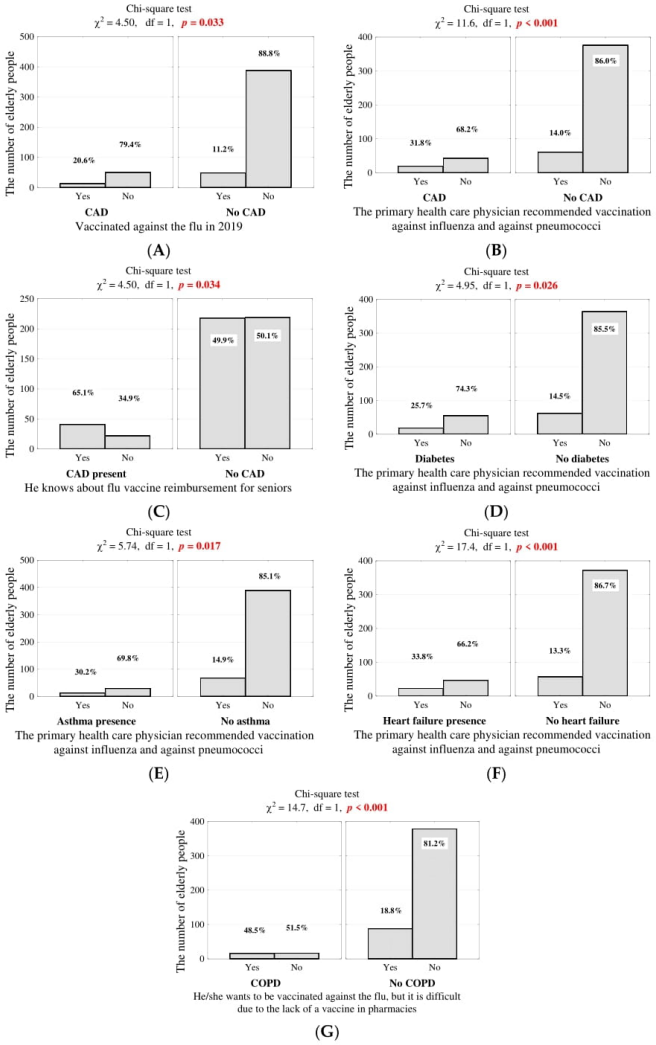

Figure 3. (**A**) Number (percentage) of people in groups that differed in 2019 influenza vaccination and coexistence of coronary artery disease; (**B**) The number (percentage) of people in the groups differing in the coexistence of coronary artery disease and the recommendation of a primary healthcare physician to vaccinate against influenza and pneumococci; (**C**) Number (percentage) of people in groups that differ in the coexistence of coronary artery disease and know about the reimbursement of influenza vaccine for seniors; (**D**) Number (percentage) of people in groups differing in the coexistence of diabetes and the recommendation of a primary healthcare physician to vaccinate against influenza and pneumococci; (**E**) The number (percentage) of people in the groups differing in the coexistence of asthma and the recommendation of a primary healthcare physician to vaccinate against influenza and pneumococci; (**F**) The number (percentage) of people in the groups differing in the coexistence of heart failure and the recommendation of a primary healthcare physician to vaccinate against influenza and pneumococci; (**G**) Number (percentage) of people in the groups differing in their responses to the question about the willingness to be vaccinated against influenza and the coexistence of COPD and the results of the independence tests.

3.6. Fear of COVID-19 Infection as a Factor Determining Attitudes toward Preventive Vaccination

To determine if the fear of COVID-19 infection affected attitudes surrounding acceptance or refusal of influenza vaccination, we asked respondents to complete the questionnaire generated based on "Fear of COVID-19 infection" scale [13]. From a total of 500 respondents, 201 were concerned about COVID-19 infection (201/500; 40.2%). In contrast, 18 respondents did not show any concerns about the pandemic (18/500; 3.6%, Table S4a).

As shown earlier (Table 1), fear of COVID-19 infection was statistically significantly correlated with attitudes toward preventive vaccinations, especially among respondents who wanted to be influenza-vaccinated and those whose primary care physician recommended influenza and pneumococcal vaccination. These groups of patients were willing to be vaccinated, but due to the fear of contracting COVID-19 infection, they decided to refuse influenza and/or pneumococcal vaccination (Table 1).

A multivariate regression analysis was performed to select independent predictors influencing negative attitudes towards influenza vaccination. Its results are presented in Table 2. The most crucial predictors of refusal to receive influenza and/or pneumococcal vaccinations were (1) net income below PLN 3000; (2) body height below 174 cm; and (3) fear of contracting the COVID-19 infection, assessed at 23 or more points using the FCV-19S (Table S4a). The odds of refusing preventive vaccination were more than two times higher among elderly patients earning less than PLN 3000 per month than among patients earning more (OR = 2.37, CI 95% [1.26–4.47]). Furthermore, the likelihood to refrain from vaccination increased nearly twofold among older people who were less than 174 cm tall, compared to taller people, and among those who were concerned about contracting the COVID-19 infection (OR = 2.56, CI 95% [1.51–4.33] and OR = 1.65, CI 95% [1.02–2.66], respectively, Table 2.).

Table 2. Results of logistic regression of univariate and multivariate sociodemographic, clinical and psychological parameters of negative attitude toward vaccination.

Risk Factors for Negative Attitude to Vaccination (NAV)	Univariate						Multivariate	
	Attitude to Vaccination				*p*	OR (95% CI)	Beta	OR
	Negative *n* = 164		Positive *n* = 336					
	n	%	*n*	%				
Income < PLN 3000	140	85.4	250	74.4	0.006	2.01 (1.22–3.30)	0.864	2.37 (1.26–4.47)
Body height < 174 cm	136	82.9	215	64.0	<0.001	2.73 (1.72–4.35)	0.940	2.56 (1.51–4.33)
SMC < 6 pts	66	45.8	105	36.6	0.076	1.47 (0.98–2.20)	0.388	1.47 (0.95–2.28)
AMTS < 10 pts	103	62.8	179	53.3	0.044	1.48 (1.01–2.17)	0.405	1.50 (0.97–2.33)
GDS-15 ≥ 4 pts	93	56.7	165	49.1	0.127	1.36 (0.93–1.98)	−0.153	0.86 (0.55–1.34)
LSND-6 < 24 pts	159	97.0	313	93.2	0.098	2.34 (0.87–6.26)	1.044	2.84 (0.91–8.89)
GLS < 16 pts	156	95.1	298	88.7	0.021	2.49 (1.13–5.46)	0.829	2.29 (0.89–5.93)
COVID-19 ≥ 23 pts	58	35.4	78	23.2	0.005	1.81 (1.20–2.72)	0.499	1.65 (1.02–2.66)
Asthma	19	11.6	24	7.1	0.125	1.70 (0.90–3.21)	0.544	1.72 (0.86–3.44)
Kidney failure	10	6.1	10	3.0	0.142	2.12 (0.86–5.19)	0.478	1.61 (0.59–4.38)

SMC—Assessment of satisfaction with the medical care received in relation to the disease, COVID-19—Fear of COVID-19 infection (in red color: the most statistically significant (p-value < 0.05) factors for a negative attitude toward vaccination).

The generalized logit regression model leading to estimation of the probability of not being vaccinated against influenza (*NAV*) takes the form of a logit:

$$\text{Logit P}\{NAV = 1 \mid X\} = -4.43 + 0.864 \times (Income < \text{PLN 3000}) + 0.940 \times (Body\ high < 174\ \text{cm}) + 0.499 \times (\text{COVID-19} \geq 23\ \text{pts})$$

The proposed model as a whole is suited to the data collected on 500 elderly people, as evidenced by the test result: Chi-square = 46.6, df = 10, $p < 0.001$.

4. Discussion

Our study revealed that from a total of 500 surveyed respondents aged > 60 years, 62 and 51 of them were influenza-vaccinated in two recent years, 2020 and 2021 (12.4% and 10.2%, respectively). This result is consistent with the general averages reporting the percentage of people receiving influenza vaccination [6,7]. To date, several studies have focused efforts into finding the reasons contributing to the low vaccination coverage rates. One of them is the fear of potential complications after vaccination, especially for older patients with chronic diseases. As it was also shown in our study, 164/500 respondents refrained from receiving an influenza vaccine for this reason (32.8%). This result emphasizes the importance of proper education, which should be provided by clinicians to their patients. Due to recognition of the group that has the highest odds of refusing a vaccine, in their efforts, clinicians should take those patients into consideration in the first place.

According to our study, net income had a crucial influence on influenza vaccination. Seniors who were vaccinated against influenza in 2019 (Figure 1A) and 2020 (Figure 1B) had significantly higher net income ($p < 0.001$). Furthermore, a multivariate regression analysis revealed that net income below PLN 3000 was one of the most crucial predictors of refusal to receive influenza vaccination (OR = 2.37, CI 95% [1.26–4.47], Table 2). These findings are consistent with other studies showing that income increases the willingness to be vaccinated [24–26]. Given the data showing that low socioeconomic status during an influenza pandemic is correlated with a greater burden of contracting the disease [27], increasing the vaccination rate in this group should be a priority.

Higher income improves the possibility of obtaining a better education and more knowledge about epidemiology and prevention methods as well as access to higher quality medical care. It is very likely that for this reason, we found a significant correlation between receiving the influenza vaccination among seniors with higher income and recommendations from their primary healthcare physicians that they do so ($p = 0.013$, Figure 1C).

Another explanation for the lower vaccination rate related to lower income may be a financial barrier to purchasing a vaccine. In our country, some necessary steps have already been taken to solve this issue. Since September 2020, according an announcement by the Minister of Health in Poland, a 50% reimbursement covers three influenza vaccines, as follows: Fluenz Tetra (AstraZeneca AB), VaxigripTetra (Sanofi Pasteur Sp. z o.o.), and Influvac Tetra (Mylan Ireland). VaxigripTetra vaccine is the one targeting elderly patients older than 65 years (retail price: PLN 51.90; approximately EUR 11, where EUR 1 = PLN 4.661; reimbursement price—PLN 25.95; approximately EUR 6.5). Furthermore, including the "Drug75+" program, this vaccine is completely free of charge to people $\geq$ 75 years of age. The Fluenz Tetra vaccine is a "live" intranasal vaccine for children from 24 to 60 months of age, while Influvac Tetra vaccine is an inactivated intranasal vaccine for people aged 18 to 65 years old at risk of severe influenza (after parenchymal organ transplant, respiratory failure, asthma), bronchial diseases, COPD, cardiovascular failure, coronary artery disease, renal failure, recurrent nephrotic syndrome, liver diseases, metabolic diseases including diabetes, neurological and neurodevelopmental disorders, and impaired immune system [28,29]. According to our study, 259 patients already knew about influenza vaccine reimbursement for seniors (259/500; 51.8%). Thus, there was still a possibility that patients were unaware of the many benefits implemented by health authorities to promote preventive vaccinations, and it is critical to inform them about these government policies, especially older adults who usually do not have quick and easy access to the internet.

Furthermore, a negative attitude about being vaccinated was correlated with the lack of vaccine availability in pharmacies (104/500; 20.8%). This was another area for improvement and national solutions to simplify access to vaccines for patients. In Poland, for many years, influenza vaccines were dispensed mainly by pharmacies, based on prescriptions from primary healthcare physicians. Nowadays, Polish healthcare authorities are making

significant efforts to improve the convenience of influenza vaccination for the general public. For instance, to solve the problem of non-availability of influenza vaccines in pharmacies, public health authorities have increased the number of vaccines ordered from manufacturers [30]. Furthermore, in late 2021, legislative measures introduced free vaccines for all patients over 18 years of age, which may also be provided at pharmacies [31,32]. This change may bring many benefits, as it increases the availability of the vaccine, removes potential financial problems with purchasing it, and also lowers the need for personal medical consultations, which are generally time-consuming [30,33]. Moreover, taking into account the prevailing COVID-19 pandemic, such a solution reduces the need for GP appointments and lowers the risk of potential exposure to infection.

Patients with underlying chronic diseases are another population that should receive special education about influenza prophylaxis, as they may experience exacerbation of their symptoms due to viral infection. Underlying conditions may influence the influenza course and severity. Such an interrelation between numerous conditions was analyzed in several observational studies. For instance, when it comes to cardiovascular diseases, Kwong et al. identified a 6-fold increased risk of myocardial infarction within seven days of confirmed influenza infection [34]. Another study showed that patients with comorbidities who required hospitalization due to influenza have a higher risk of readmission due to chronic diseases during the following year. The most common reasons for rehospitalizations included pulmonary, renal, liver, or cardiovascular diseases as well as diabetes or immunosuppression [35]. At the same time, it should be mentioned that vaccination significantly reduces the risk of hospitalization due to influenza as well as lowering mortality in patients with underlying health conditions [36,37].

Our study showed that elderly people with diabetes, asthma, or heart failure were more often recommended to vaccinate against influenza (25.7% vs. 14.5%; $p = 0.026$, Figure 3D; 30.2% vs. 14.9%; $p = 0.017$, Figure 3E, and 33.8% vs. 13.3%; $p < 0.001$, Figure 3F). These findings show that healthcare workers understand the need to promote preventive vaccinations among people with chronic diseases. However, there is still major room for improvement in this area, especially in view of the finding by our study that of the whole study population, only 81/500 patients (16.2%) received recommendations to be vaccinated. Here, the enormous role of GP doctors in promoting vaccinations should be mentioned [38]. According to many studies conducted in different populations eligible for various vaccines, receiving a recommendation to undergo a vaccination is one of the most important factors that contributes to increased vaccination rates [24,39–41].

According to our recently published article [22], from a total of 500 respondents, 201 were concerned about COVID-19 infection (201/500; 40.2%). In contrast, only 18 respondents did not show any concerns about the pandemic (18/500; 3.6%, Table S4a). These results prompted us to understand how the fear of COVID-19 infection contributed to attitudes about influenza vaccination. Our results demonstrated that people concerned about COVID-19 infection decided to refuse influenza vaccination more often (OR = 1.65, CI 95% [1.02–2.66], Table 2). This result is in contrast to a recently published study performed by Samel-Kowalik et al. in Poland on a group of 1052 individuals aged 18+, which found that respondents who cited negative attitudes toward COVID-19 vaccination were more often likely to cite a lack of willingness to vaccinate against influenza [30]. In addition, the statistical data showing influenza vaccination coverage rates worldwide do not confirm our finding [6]. Since both viral infections may exhibit similar symptoms, it is difficult to distinguish between them, thus posing an extra burden to healthcare services. Furthermore, because of the seasonality of influenza outbreaks and the continued prevalence of COVID-19, these viruses may circulate in parallel, which elevates the potential risk of coinfection [42]. Recently, several studies determined the potential preventive effect of influenza vaccination against COVID-19 infection [43–45]. However, these studies require further investigation, as many studies also show a lack of positive correlation between influenza vaccination and the mortality and morbidity rates of COVID-19 infections [46–49].

Such contradictory information, additionally stigmatized in social media, may cause much confusion and misunderstanding.

Surprisingly, we also found body height to be a statistically significant factor in determining attitudes toward receiving preventive vaccination against influenza in the elderly population. Seniors with a body height below 174 cm were more likely to refrain from influenza vaccination (OR = 2.56, CI 95% [1.51–4.33], Table 2). To date, the number of studies that have taken up this challenge remain scarce. However, they focused on identifying associations between body height and immune response after hepatitis B vaccination [45,50,51]. No study reported these associations in regard to influenza vaccination, or they did not find any significant correlations [52]. Therefore, we came to the conclusion that in this cross-sectional study, this finding without any scientific support has no clinical significance. Our study has some limitations. First, the data were obtained by completing the questionnaire based on recorded telephone calls, and the response rate was relatively low, at 40%. The second limitation was the cross-sectional nature of this study. This may limit the generalizability of our results to a wider population and claims about the directionality of the results. Furthermore, respondents recalled their answers to the questions from memory. These answers may have been subjected to recall bias, thus increasing the risk of overreporting or underreporting the final results of this study.

Despite its limitations, the present work adds to the existing literature in several ways. First, we indicated the groups of elderly people to which special attention is required during medical consultations to persuade them to proceed with influenza vaccinations. Furthermore, we identified barriers influencing patients' hesitancy to be influenza-vaccinated. Understanding these barriers may be crucial to implement new vaccination programs and/or promote existing programs through social media, leaflets in waiting rooms, as well as during medical consultations with primary healthcare professionals. Last but not least, this work illustrated the effects of the fear of contracting the COVID-19 infection on the willingness to receive the influenza vaccination. Although we found contrasting results from other studies, this correlation needs further consideration.

5. Conclusions

Annual influenza vaccination is critical in reducing the risk of hospitalization due to influenza. In November–December 2020, from a total of 500 respondents, only 62 (12.4%) and 51 (10.2%) of them underwent influenza vaccination in 2019 and 2020, respectively. Our study identified factors limiting the receptiveness to influenza vaccination: net income < PLN 3000, body height < 174 cm, and the fear of COVID-19 infection. Our results highlighted room for improvement in increasing public confidence and promoting vaccination in order to increase the vaccination rate among the elderly population. Successful implementation of appropriate preventive measures in the area of infectious diseases allows healthcare workers to focus more on patients with other diseases that may be more difficult to prevent. The low influenza vaccination rate in Poland emphasizes the need to conduct more research and gain better understanding of the current situation and introduce the most appropriate solutions to increase the vaccination rate in our population.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/vaccines10050651/s1, Table S1: General characteristics of the studied elderly people; Table S2: Clinical characteristics of the studied people; Table S3: Characteristics of the mental traits of the respondents; Table S4: (a) Assessment of fear of COVID-19 infection; (b) Analysis of the homogeneity of the items in the scale of fear of COVID-19 infection; Table S5. Number (percent) of 500 seniors' affirmative responses to contraceptive self-survey questions.

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Sociodemographic and Health-Related Factors Influencing Drug Intake among the Elderly Population

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Abstract: Excessive drugs intake among the elderly population, including self-medication, constitutes an important public health problem. Polypharmacy may lead to numerous adverse health effects, which become more prevalent when combined with biological changes in seniors. In this cross-sectional study, 500 Polish adults aged ≥60 years (M = 67.9 ± 4.2) were asked to complete a questionnaire via telephone calls, allowing us to identify sociodemographic and health-related factors influencing the daily medications consumption. Our findings revealed that all of the participants were receiving medications; 60.2% of them receive at least 1 to 3 drugs per day (301/500). The most commonly used medications included antihypertensive drugs and analgesics (51.0% and 46.0%, respectively). Taking into account clinical conditions, independent predictors of receiving over 3 medications per day turned out to be (1) coronary artery disease (OR = 6.77; CI 95%, 2.86–16.1), (2) diabetes (OR = 3.23, CI 95%, 1.75–5.95), (3) asthma (OR = 4.87, CI 95%, 2.13–11.1), (4) heart failure (OR = 3.38, CI 95%, 1.59–7.19) and (5) gastroesophageal reflux disease (OR = 1.93, CI 95%, 1.03–3.62). Participants suffering from depression were more likely to take drugs for hypertension (OR = 1.70, CI 95%, 1.04–2.78), while those with anxiety and social loneliness took more painkillers (OR = 2.59, CI 95%, 1.58–4.26 and OR = 2.08, CI 95%, 1.38–3.13, respectively). The most significant sociodemographic factors increasing the drugs intake among the population included in our study were high body mass and subsequent increased BMI values (OR = 2.68, CI 95%, 1.50–4.77). Furthermore, living in a city with over 400,000 inhabitants increased the likelihood of taking antidepressants (OR = 2.18, CI 95%, 1.20–3.94). Our study revealed factors increasing the risk of excessive medications intake and hence, increased susceptibility to some iatrogenic diseases among the elderly population. These factors should be considered by primary care physicians while prescribing appropriate drugs to elderly patients.

Keywords: sociodemographic factors; drug intake; elderly population

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1. Introduction

Physicians taking care of elderly patients face many challenges resulting from the specificity of the geriatric population compared with younger adults. Alongside with increasing age, there is a higher prevalence of multimorbidity [1], which often implies a need for a more complex pharmacotherapy regimen. It is one of the reasons why the prevalence

of polypharmacy, defined as routinely taking a minimum of five medications, including drugs prescribed by a doctor, bought over the counter (OTC) as well as traditional, herbal or complementary medicines [2], is increasing with age [3]. Polypharmacy constitutes a significant health problem among the elderly population. It is associated with many harmful effects, including adverse drug reactions, drug-drug reactions, higher mortality and fall rates, prolonged stay in a hospital, readmission to a hospital soon after discharge as well as increased healthcare costs and risk of medical nonadherence [4–6]. Moreover, aging is also related to changes in pharmacodynamic and pharmacokinetic properties of drugs, decreased renal and liver function, lower body and muscle mass, poor nutritional status, and lower hydration level, which puts the elderly patients at higher risk of experiencing adverse drug reactions [7].

Despite the increasing knowledge about adverse health consequences of a polypharmacy, some alarming data indicate that more than 40% or even more than half of the prescribed drugs may not have sufficient clinical justification [8,9]. It is worth mentioning that the problem is considered as the most significant among the oldest patients, aged 80 years and more [9]. Some drugs are also being prescribed as a part of a prescribing cascade, when an adverse drug reaction occurs and is misinterpreted as a new medical condition, resulting in a subsequent drug prescription to treat it [10]. Some examples of a prescribing cascade may include calcium channel blockers causing ankle oedema followed by prescribing diuretics or ACEI causing cough, treated with antitussives [11].

Another major challenge in pharmacotherapy in the elderly population is self-medication and usage of over-the-counter (OTC) dispensed drugs. According to Cybulski et al., most seniors buy OTC drugs, and more than 40% of seniors take one OTC drug regularly [12]. As those drugs may be purchased without a prescription, it makes them readily available to patients. However, these drugs may still interact with other medications or may be used incorrectly, causing severe adverse health effects.

The population of people over 60 is constantly growing, currently much faster than in recent years. According to WHO, in 2050 it will constitute 22% of the global population [13]. It emphasizes the need to provide high-quality specialistic care for the elderly and makes it a priority for health care systems in the upcoming years. This makes a need to deepen the knowledge and extend the research in this area more urgent. Therefore, our study aimed to define which medication groups, both prescribed by health practitioners as well as OTC drugs bought by patients without medical prescription, are used most commonly in the elderly population in Poland. We also managed to identify health-related and socioeconomic factors with the most significant impact on the usage of a higher number of medications in older people. We believe that these data will sensitize health care providers about the problem of proper pharmacotherapy in the elderly population and enable them to focus their efforts on revising the treatment of their patients, starting with those who are at the highest risk of having unproper treatment regimen.

2. Materials and Methods

2.1. Study Design

A cross-sectional study was carried out in November–December 2020 in Poland. We surveyed a representative sample of 500 adults, including 290 women (58%) and 210 men (42%), of age 60 and above (M = 68, SD = 4.2). The evaluated sample of the elderly population was provided by Biostat Sp. z o.o. and obtained by a stratified sampling per voivodeship demographic structure of Poland. Target quotas were set for age and gender in each of the geographical regions. All the participants were interviewed by computer-assisted telephone calls. The gross sample was 1250. The identity of a participant was confirmed at the beginning of the interview. Interviewers were adequately trained and prepared to ensure the equal and adequate quality of the interview. Moreover, all interviews were supervised by a specialist. A study coordinator additionally evaluated recorded conversations. The transcripts were not returned to participants for any comment and/or correction, nor were repeat interviews carried out. The duration of the interview

ranged from 15 to 20 min. Participants provided their verbal consent at the beginning of the interview and were informed about the goal of the survey. No compensation was provided for participating in the study. The study was approved by the Bioethics Committee of Wroclaw Medical University.

2.2. Explanatory Variables

The questionnaire used in the study included questions regarding the respondent's sociodemographic data (Table 1), mental and physical health conditions (Table S1), existing comorbidities and taking influenza vaccination in 2019 and 2020 (Table 2). Sociodemographic data included: (1) gender (male or female), (2) age (categorized as 60–64; 65–69; 70 and more), (3) place of residence (village; town less than 20,000 inhabitants; town between 20,000 to 100,000 inhabitants; town between 100,000 to 200,000 inhabitants; town between 200,000 to 400,000 inhabitants; town more than 400,000 inhabitants), (4) household size (living alone; living with a partner; living with a partner and children; living with a family, (5) education (primary, vocational, secondary, higher), (6) body weight (kg), (7) body height (cm) and (8) BMI (kg/m^2). Patients were also asked for (9) household net income per person per month (in Polish currency-PLN, categorized as less than 500 PLN; 501–1000 PLN; 100–2000 PLN; 2001–3000 PLN; more than 3000 PLN; refusal to answer). Data allowing to determine the mental and physical health conditions among the elderly population involved in the study were collected based on specified and validated scales, including (1) Katz Activities of Daily Living Scale (ADL) [14], (2) Lawton Instrumental Activities of Daily Living Scale (IADL) [15], (3) Abbreviated Mental Test Score (AMTS) [16], (4) Geriatric Depression Scale (GDS-15) [17], (5) Geriatric Anxiety Scale (GAS-10) [18], (6) Lubben Social Network Scale (LSNS-6) [19], (7) Social Loneliness Scale (Gierveld Scale; GLS) [20] and (8) Mini Nutritional Assessment (MNA) [21]. Questions regarding chronic diseases included: coronary artery disease, diabetes mellitus, asthma, COPD, heart failure, kidney failure and gastroesophageal reflux disease.

Table 1. General characteristics of the studied elderly people.

Feature (Variable)	Statistics
Gender	
Women	290 (58.0%)
Men	210 (42.0%)
Age (years)	
60–64	141 (28.2%)
65–69	128 (25.6%)
70 and more	231 (46.2%)
Domicile	
Village	110 (22.0%)
City up to 20,000 inhabitants	56 (11.2%)
A city with 20,000 to 100,000 inhabitants	136 (27.2%)
A city with 100,000 to 200,000 inhabitants	62 (12.4%)
A city with 200,000 to 400,000 inhabitants	39 (7.8%)
A city with over 400,000 inhabitants	97 (19.4%)
Household size	
I live alone	108 (21.6%)
I live with my partner	202 (40.4%)
I live with my partner and our children	117 (23.4%)
I live alone with my children	35 (7.0%)
I live with a family	29 (5.8%)
A different situation	9 (1.8%)

Table 1. *Cont.*

Feature (Variable)	Statistics
Education	
Primary	8 (1.6%)
Vocational	105 (21.0%)
Secondary	245 (49.0%)
Higher	142 (28.4%)
Body mass (kg)	
M ± SD	78.5 ± 15.7
Me (IQR)	76 (67–88)
Min–Max	48–140
Body height (cm)	
M ± SD	169 ± 9
Me (IQR)	168 (163–175)
Min–Max	141–210
BMI (kg/m^2)	
M ± SD	27.4 ± 4.6
Me (IQR)	27 (24–30)
Min–Max	19–46
Net income per person in the household per month	
<500 PLN	5 (1.0%)
501–1000 PLN	24 (4.8%)
1001–2000 PLN	188 (37.6%)
2001–3000 PLN	158 (31.6%)
Above 3000 PLN	110 (2.0%)
Refusal	15 (3.0%)

Table 2. Clinical characteristics of the studied people.

Chronic Diseases:	Statistics
Coronary artery disease	63 (12.6%)
Diabetes	74 (14.8%)
Asthma	43 (8.6%)
COPD	33 (6.6%)
Heart failure	71 (14.2%)
Kidney failure	20 (4.0%)
Physician-diagnosed gastroesophageal reflux disease (GERD)	68 (13.6%)
Vaccinations:	Statistics
He/she was vaccinated against the flu in 2019	62 (12.4%)
He/she was vaccinated against the flu in 2020	51 (10.2%)
Avoids vaccination because of possible complications	164 (32.8%)
You want to get vaccinated against the flu, but it is difficult due to the lack of a vaccine in pharmacies	104 (20.8%)
The primary care physician recommended flu and pneumococcal immunization	81 (16.2%)
He/she knows about flu vaccine reimbursement for seniors	259 (51.8%)

2.3. Measures

An original questionnaire containing seven questions was used to evaluate pharmacological treatment among the representatives of elderly population in Poland (Table 3). We asked participants about (1) the number of medications taken (1–3; 4–6; 7–10; >10) and (2) which group do they belong to (hypertension drugs; diuretics; painkillers; anticoagulants; antidepressants). Furthermore, respondents were asked (3) if the same doctor

prescribed all medication or not; (4) if no; how many (1; 2; 3; 4; 5 and more). We also wanted to know if the patient (5) informed his or her family doctor about all new medications taken and (6) bought drugs and/or supplements without a prescription; (7) if yes, which ones (painkillers; drugs for heartburn; herbal medications; vitamins; other). Based on the results obtained, independent predictors of using more medications in the elderly population were determined, using the logit models. In each section, we presented the multivariate logistic regression analysis of different drug groups and socioeconomic conditions as well as the clinical and mental characteristics of the surveyed respondents.

Table 3. Characteristics of pharmacological treatment of the studied persons.

Questionnaire Questions	Statistics
1. How many drugs are you currently taking?	
1–3	301 (60.2%)
4–6	151 (30.2%)
7–10	40 (8.0%)
>10	8 (1.6%)
2. Which group of medications do they belong to?	
Hypertension drugs	255 (51.0%)
Diuretics	78 (15.6%)
Painkillers	230 (46.0%)
Anticoagulants	87 (17.4%)
Antidepressants	78 (15.6%)
3. Have you been prescribed all the medications by the same doctor?	
Yes	352 (70.4%)
No	148 (29.6%)
4. How many different doctors prescribed the medications you are taking?	
1	352 (70.4%)
2	82 (16.4%)
3	52 (10.4%)
4	10 (2.0%)
5 and more	4 (0.8%)
5. Do you inform your family doctor about all new medications?	
Yes	391 (78.2%)
No	109 (21.8%)
6. Do you buy drugs and/or supplements without a prescription?	
Yes	378 (75.6%)
No	122 (24.4%)
7. Please select over-the-counter medications/supplements:	
Painkillers (paracetamol, ibuprofen, acetylsalicylic acid, metamizole, ketoprofen, diclofenac)	305 (61.0%)
Drugs for heartburn (proton pump inhibitors, for example: omeprazole, pantoprazole, etc.)	132 (26.4%)
Herbal (St. John's wort, ginseng, Ginkgo biloba)	155 (31.0%)
Vitamins (C, B, D)	345 (69.0%)
Other (magnesium, potassium, calcium, zinc, selenium)	96 (19.2%)

2.4. Statistical Analysis

Nominal qualitative (e.g., gender) and ordinal (e.g., age group) variables are presented in the contingency tables in the form of frequency (n) and proportion (%). Quantitative variables (e.g., BMI) with a distribution close to normal are presented in tables and graphs with mean and standard deviations ($M \pm SD$). In cases where their distribution differed significantly from a standard (which was verified by the Kolmogorov Smirnov test), we presented these correlations in the form of medians and quartile ranges-Me (Q1–Q3).

Chi-square tests of independence were used to assess the significance of the correlation between the two qualitative variables. The significance of differences between the average values of quantitative variables in the two groups was assessed using the Mann-Whitney U test. The Kruskal-Wallis test was used for a more significant number of groups. For multiple comparisons (post-hoc tests), the Bonferroni correction was taken into account.

Continuous or step quantitative parameters were transformed into dichotomous variables. ROC curves and Youden's index were used to determine cut-off values. For the established threshold values, the sensitivity and specificity were estimated.

The multivariate logistic regression analysis and the method of backward elimination were used to determine the parameters significantly correlating with the number of taken drugs greater than 3.

The quality of the model was assessed based on the statistics of the Hosmer-Lemeshow test and determination coefficients; the statistical significance of the entire model was checked using the likelihood ratio test (LR test), while the statistical significance of a specific variable in the model was based on Wald's test.

All analyses were performed using the statistical software package Statistica. A p-value of <0.05 was considered to be statistically significant.

3. Results

The cross-sectional analysis included 500 participants–290 women (58%) and 210 men (42%) of age 60 and more (M = 67.9 $\pm$ 4.2). The response rate was equal to 40%. Most of the participants lived in a city between 20,000 to 100,000 inhabitants (136/500; 27.2%) and fewer in villages (110/500; 22.0%). Most respondents were relatively highly educated; only eight people had primary education (8/500; 1.6%). Based on the given measurements of body mass and height, we calculated all participants' body-mass index (BMI) (M = 27.4 $\pm$ 4.6). According to the World Health Organization (WHO) report, this result shows respondents were slightly overweight [5]. Considering household income per person per month, five people earned less than 500 PLN (5/500; 1.0%), 24 people earned between 501 PLN and 1000 PLN (24/500; 4.8%), 188 people earned between 1001 PLN and 2000 PLN (188/500; 37.6%), 158 people earned between 2001 PLN and 3000 PLN (158/500; 31.6%) and 110 respondents earned more than 3000 PLN (110/500; 22.0%) per person per month. This result should be considered with caution, as due to the restrictions caused by a prevailing COVID-19 pandemic, many people had lost their jobs or had lowered salaries. Detailed data on the general characteristics of the surveyed people showing their sociodemographic data are presented in Table 1.

According to the ADL scale, most participants were fit (493/500; 98.6%). However, according to the GDS-15 scale, more than one-third of the study group showed depressive symptoms that indicated depression (176/500; 35.2%). According to the LSNS-6 scale, they exhibited proper social engagement (mean = 14.2 $\pm$ 5.9) and didn't feel lonely (according to the Gierveld Scale (GLS), mean = 13.1 $\pm$ 1.8). According to the MNA scale, most of the participants had a proper nutritional status (418/500, 83.6%). Detailed data on the psychological characteristics of the surveyed people are presented in Table S1.

Most of the participants suffered from one or more chronic diseases, such as coronary artery disease (n = 63, 12.6%), diabetes mellitus (n = 74, 14.8%), asthma (n = 43, 8.6%), COPD (n = 33, 6.6%), heart failure (n = 71, 14.2%), kidney failure (n = 20, 4.0%) and gastroesophageal reflux disease (n = 68, 13.6%). Only 62 (12.4%) and 51 (10.2%) participants underwent influenza vaccination in 2019 and 2020, respectively. Such a low interest in vaccination was caused by a fear of possible vaccine adverse effects (n = 164, 32.8%) and lack of vaccines in pharmacies (n = 104, 20.8%). Moreover, the primary care physician recommended vaccination against influenza and pneumococci only in 81 (16.2%) participants. More than 50% of the study group knew about the flu vaccine reimbursement for seniors (259/500; 51.8%). Detailed data on the clinical characteristics of the studied people are shown in Table 2.

All of the participants were receiving medications. Most of them (n = 301, 60.2%) took 1 to 3 drugs, and 8 respondents used more than 10 drugs regularly (8/500; 1.6%). The most commonly used medications were antihypertensive drugs (n = 255, 51.0%) and analgesics (n = 230, 46.0%), followed by anticoagulants (87/500; 17.4%), diuretics (78/500; 15.6%) and antidepressants (78/500; 15.6%). One doctor treated the all of the patients' diseases in 352 cases (352/500; 70.4%). Furthermore, 391 respondents claimed that they confessed the doctor to take any new medication (391/500; 78.2%). It is worth mentioning that the majority of participants bought medication without prescription (n = 378, 75.6%), mostly analgesics (n = 305, 61.0%) and vitamins (n = 345, 69.0%) (Table 3).

The study revealed no correlation ($p > 0.05$) between the number of medications taken and gender, age, multiplicity of residence, living with a household member or alone, level of education as well as net income (Table S2). However, it was observed that the greater the patient's body mass and thus the higher the BMI, the greater the amount of medication taken ($p < 0.001$, Figure 1A,B, Table S2). Based on the Younden Index, it was also found that patients who weighed more than 73 kg and those who had BMI above 25.86 (classified as overweight) took more medications ($p < 0.001$, Figure 2A,B). It was also noted that participants who were prescribed medicines by two or more doctors used to take more medicines than those who were treated only by one doctor ($p < 0.001$, Figure 2C).

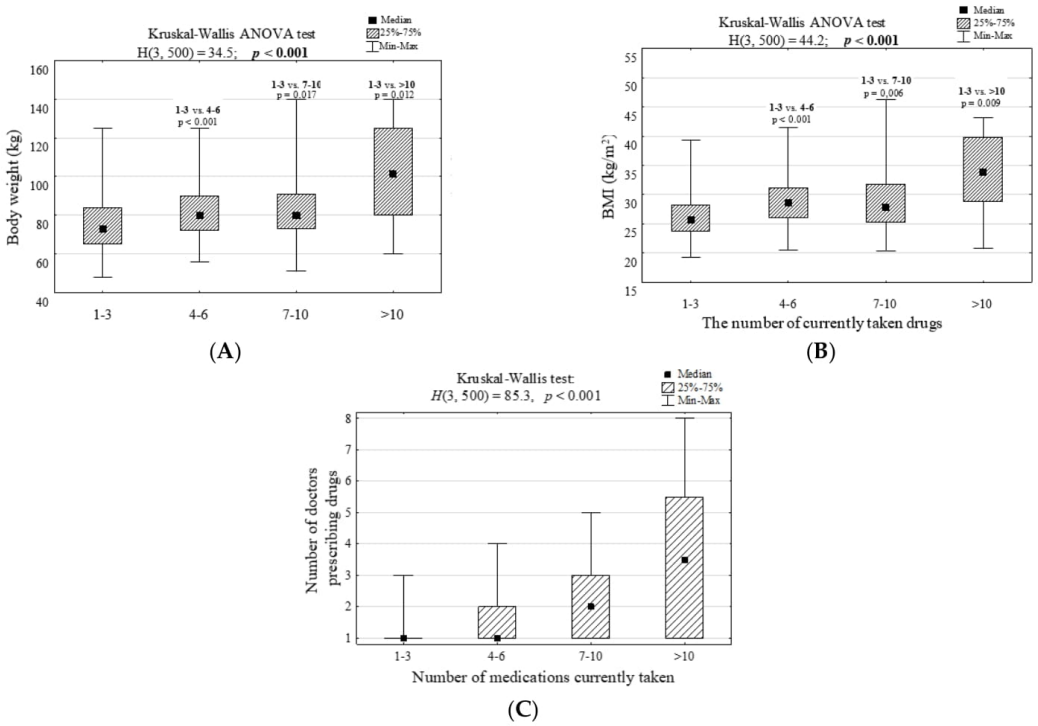

Figure 1. (**A**) Body weight, (**B**) body mass index and (**C**) number of doctors prescribing medicines to people differing in the number of currently taken medications and the results of significance tests.

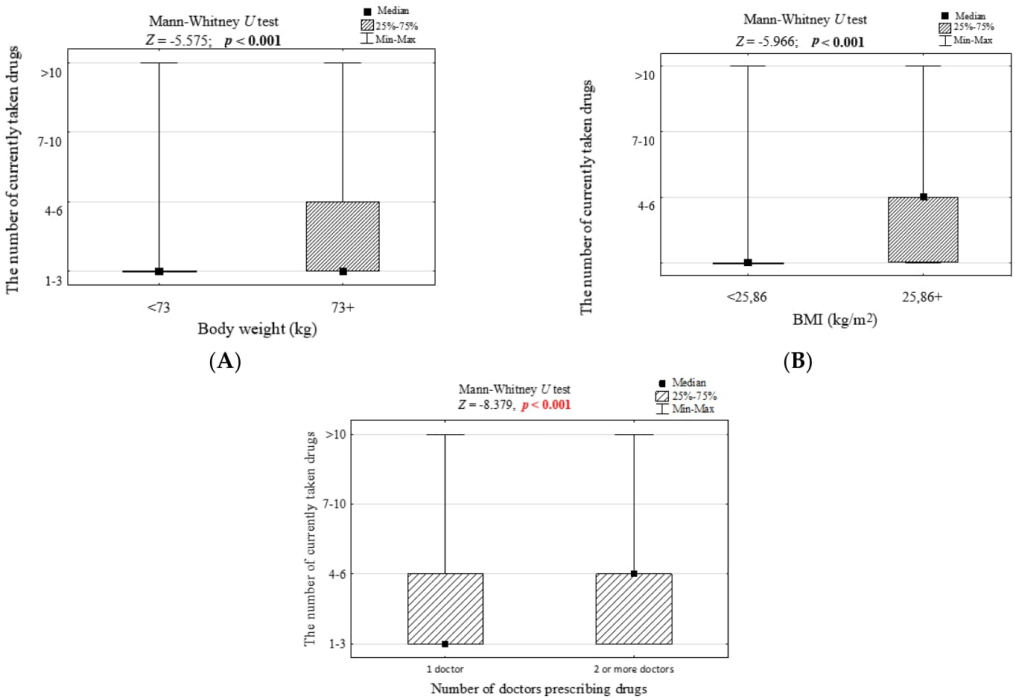

Figure 2. The number of drugs currently taken in groups of people differing in (**A**) body weight, (**B**) body mass index, the number of doctors who prescribed medicines (**C**) and the results of significance tests.

In the next section of the survey we used different scales to evaluate potential correlations between the number of currently taken drugs and the mental characteristics of elderly patients. Based on the ADL scale, it was found that patients who took more medications had a greater disability in performing basic activities of daily living ($p = 0.017$, Table S3). Furthermore, patients taking more medications had more difficulties performing complex activities (according to the IADL scale; $p < 0.001$, Table S3). Moreover, the more medications were taken, the increased likelihood to show depressive symptoms (according to GDS-15 scale; $p < 0.001$), anxiety (according to GAS-10 scale; $p = 0.001$), social isolation (according to LSNS-6 scale; $p = 0.048$), and malnutrition (according to MNA scale; $p = 0.005$, Table S3) was observed. In contrast, there was no correlation between the number of drugs taken and mental health levels (as shown on the AMTS scale) and loneliness (as shown on the Gierveld scale), Table S3.

When classifying the respondents into groups with different mental characteristics, the criteria of the standardized tools used were adopted: disability in performing everyday activities (ADL < 5 points), depression (GDS-15 > 5 points) and the risk of malnutrition (MNA < 15 points). For complex daily life activities (IADL), elderly anxiety scores (GAS-10) and elderly social isolation scores (LSNS-6) threshold values were established based on the analysis of ROC curves (Figure S1). The areas under the curve (AUC) for the combined IADL daily activities and the assessment of anxiety in the elderly (GAS-10) are significantly greater than 0.5 (lower 95% confidence limits for AUC are greater than 0.5), which means that both these parameters have weak but statistically significant classification abilities (better than a coin toss). The parameter LSNS-6 has no classification capabilities. This

statistical analysis led us to the conclusion that people with disabilities in complex daily life activities (IADL, Figure 3A), depression (GDS-15, Figure 3B), anxiety (GAS-10, Figure 3C) and the risk of malnutrition (MNA, Figure 3D) were taking significantly more medications ($p < 0.05$). The values of people with disabilities to perform basic activities of daily living (as shown in ADL < 5 points) were excluded from the analysis due to the small sample size (7/500; $p = 0.049$), which could lead to false-positive results.

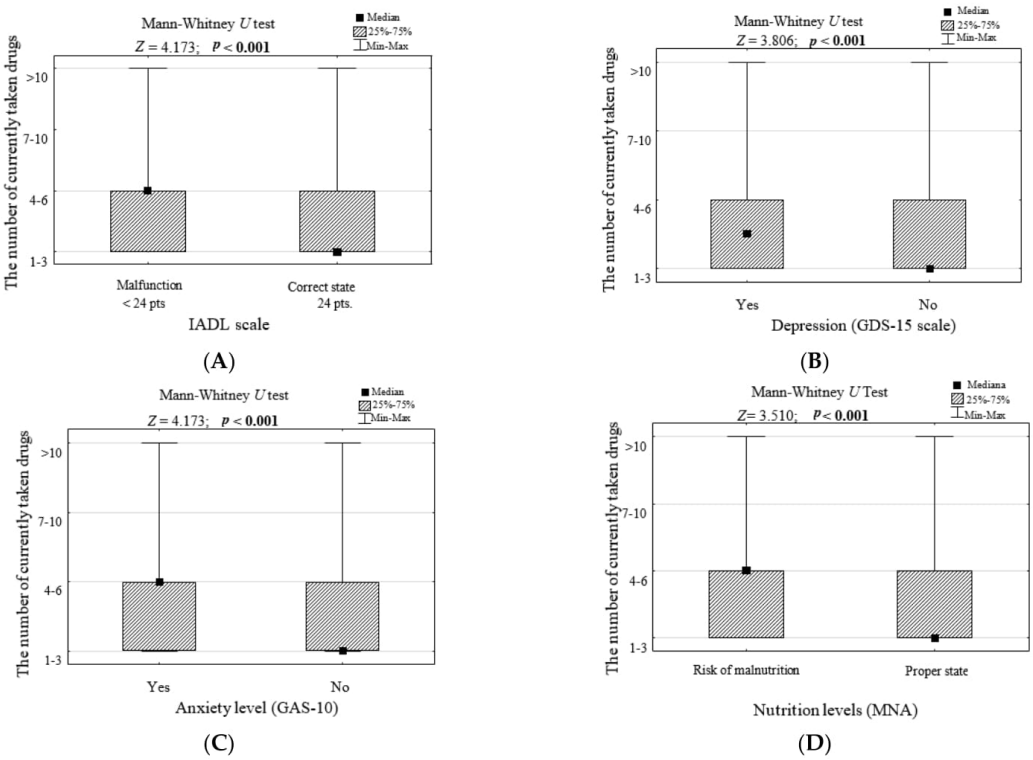

Figure 3. The number of medications currently taken in groups of people with different mental characteristics including (**A**) the assessment of complex activities in daily living, (**B**) depression, (**C**) the level of anxiety, (**D**) the level of malnutrition and the results of significance tests.

Including data regarding sociodemographic, clinical, and mental characteristics of elderly patients, we found that independent predictors of taking a large number of medications per day (over 3) were (1) the presence of coronary artery disease (CAD), (2) diabetes (DM), (3) asthma (AST), (4) heart failure (HF), (5) BMI > 25.9 kg/m^2 and (6) gastroesophageal reflux disease (GERD) (Table 4). The likelihood of taking more than three medicines per day increases approximately seven times when patients had coronary artery disease (OR = 6.77; CI 95%, 2.86–16.1). Furthermore, patients with BMI > 25,9 kg/m^2 took more than 3 medications per day nearly three times more often than those with BMI < 25,9 kg/m^2 (OR = 2.68, CI 95%, 1.50–4.77). Moreover, the significant correlation was also observed in participants with diabetes, asthma, heart failure and gastroesophageal reflux disease (OR = 3.23, CI 95%, 1.75–5.95; OR = 4.87, CI 95%, 2.13–11.1; OR = 3.38, CI 95%, 1.59–7.19 and OR = 1.93, CI 95%, 1.03–3.62, respectively).

Table 4. Results of logistic regression of univariate and multivariate sociodemographic, clinical and mental parameters with the use of more than 3 drugs a day.

Predictors of Taking More than 3 Drugs a Day	Univariate						Multivariate
	Number of Drugs				*p*	OR (95% CI)	OR (95% CI)
	4 or More *n* = 199		1–3 *n* = 301				
	n	%	*n*	%			
Body mass > 73 kg	150	75.4	152	50.5	<0.001	3.00 (2.02–4.45)	1.48 (0.83–2.61)
BMI > 25.9 kg/m^2	**152**	**76.4**	**146**	**48.5**	**<0.001**	**3.43 (2.31–5.11)**	**2.68 (1.50–4.77)**
ADL < 5 pkt.	195	98.0	298	99.0	0.444	0.49 (0.11–2.22)	1.18 (0.16–8.62)
IADL < 24 pkt.	78	39.2	140	46.5	0.118	0.74 (0.52–1.07)	1.52 (0.92–2.50)
GDS-15 > 5 pkt.	105	52.8	144	47.8	0.315	1.22 (0.85–1.74)	1.28 (0.72–2.25)
GAS-10 > 7 pkt.	101	50.8	100	33.2	<0.001	2.07 (1.44–2.99)	1.46 (0.90–2.36)
LSND-6 < 15 pkt.	105	52.8	144	47.8	0.315	1.22 (0.85–1.74)	0.94 (0.60–1.49)
MNA < 12 pkt.	46	23.1	36	12.0	0.001	2.21 (1.37–3.57)	1.83 (0.99–3.38)
CAD	**54**	**27.1**	**9**	**3.0**	**<0.001**	**12.1 (5.80–25.2)**	**6.77 (2.86–16.1)**
Diabetes	**51**	**25.6**	**23**	**7.6**	**<0.001**	**4.17 (2.45–7.08)**	**3.23 (1.75–5.95)**
Asthma	**30**	**15.1**	**13**	**4.3**	**<0.001**	**3.93 (2.00–7.75)**	**4.87 (2.13–11.1)**
COPD	20	10.1	13	4.3	0.016	2.48 (1.20–5.10)	0.37 (0.14–1.02)
Heart failure	**56**	**28.1**	**15**	**5.0**	**<0.001**	**7.47 (4.08–13.7)**	**3.38 (1.59–7.19)**
Kidney failure	12	6.0	8	2.7	0.066	2.35 (0.94–5.86)	1.62 (0.49–5.35)
GERD	**39**	**19.6**	**29**	**9.6**	**0.002**	**2.29 (1.36–3.84)**	**1.93 (1.03–3.62)**

The goodness of fitting the logistic model to the data is presented using the accuracy (Table S4) and the ROC (Receiver Operating Characteristic) curve (Figure S2). Bold distinguish significant parameters at the level of $p < 0.05$.

The significance of the model as a whole was tested on the basis of the likelihood ratio test and Wald's test. Chi-square = 172.6; df = 16; $p < 0.001$. A *p*-value very close to zero made us reject the null hypothesis that the model as a whole is irrelevant.

3.1. Antihypertensive Drugs

In the hypertension drug group, positive linear correlations with body weight (0.232), BMI (0.293), geriatric depression scale (0.104), geriatric anxiety scale (0.091), coronary artery disease (0.264), diabetes (0.228), chronic obstructive pulmonary disease (0.116), heart failure (0.250), kidney failure (0.118) have been shown. In contrast, negative linear correlations were shown by instrumental activities of daily living (−0.105) and abbreviated mental test score (−0.108) (Table S5). Based on multivariate logistic regression analysis, we found that independent predictors of anti-hypertensive drugs intake among elderly patients were AMTS < 9 pts ($p = 0.011$), CAD ($p < 0.001$), diabetes ($p < 0.001$), heath failure (HF) ($p < 0.001$) and BMI $\geq$ 29.0 kg/m^2 ($p < 0.001$). Patients with BMI $\geq$ 29 kg/m^2 and ATMS < 9 pts took approximately 3 times and 2 times more often anti-hypertensive drugs than other respondents (OR = 3,12, Cl 95%, 1.85–5.27 and OR = 1.70, Cl 95%, 1.04–2.78, respectively). Furthermore, patients suffering from diabetes, heart failure and coronary artery disease took approximately 3 times, 2.5 times and 4 times more often hypertension drugs than other respondents (OR = 2.88, Cl95%, 1.53–5.43, OR = 2.46, Cl 95%, 1.18–5.15 and OR = 4.05, Cl 95%, 1.79–9.21, Table 5).

Table 5. Sociodemographic, clinical and mental characteristics in groups that differ in hypertension medication intake and test results.

Feature (Variable)	He/She Is Taking Medication for High Blood Pressure				*p*-Value	OR (95% CI)	Multivariate Logistic Regression
	Yes *n* = 255		No *n* = 245				OR (95% CI)
Body weight ≥ 75 kg	169	66.3	111	45.3	<0.001	2.37 (1.65–3.41)	1.03 (0.63–1.66)
BMI ≥ 29.0 kg/m^2	118	46.3	46	18.8	<0.001	3.73 (2.49–5.58)	**3.12 (1.85–5.27)**
IADL < 23 pts	64	25.1	40	16.3	0.020	1.72 (1.10–2.67)	1.18 (0.71–1.97)
AMTS < 9 pts	65	25.5	39	15.9	0.011	1.81 (1.16–2.81)	**1.70 (1.04–2.78)**
GDS ≥ 3 pts	173	67.8	138	56.3	0.010	1.64 (1.14–2.36)	1.20 (0.76–1.90)
GAS ≥ 6 pts	161	63.1	129	52.7	0.019	1.54 (1.08–2.20)	1.08 (0.69–1.72)
CAD	54	21.2	9	3.7	<0.001	7.04 (3.39–14.6)	**4.05 (1.79–9.21)**
Diabetes	58	22.7	16	6.5	<0.001	4.21 (2.35–7.57)	**2.88 (1.53–5.43)**
COPD	24	9.4	9	3.7	0.011	2.72 (1.24–5.99)	1.58 (0.64–3.95)
Heart failure	58	22.7	13	5.3	<0.001	5.25 (2.80–9.87)	**2.46 (1.18–5.13)**

Bold for parameters significant at $p < 0.05$.

3.2. Diuretics

In the group of diuretics drugs, a positive linear correlation was shown with body weight (0.122), BMI (0.125), coronary artery disease (0.235), diabetes (0.131), heart failure (0.157) and gastroesophageal reflux disease (0.183). In contrast, a negative linear correlation occurred in instrumental activities of daily living (−0.143) and mini nutritional assessment (−0.135) (Table S5). Based on multivariate logistic regression analysis, we found that independent predictors of diuretics intake among elderly patients were body weight ($p < 0.001$) and coronary artery disease ($p < 0.001$). Patients with body weight ≥73 kg were approximately 2.5 times more likely to take diuretics than patients < 73 kg (OR = 2.52, CI 95%, 1.21–5.26, Table 6). Furthermore, we observed a more than threefold increase in consuming diuretics among elderly patients with coronary artery disease (OR = 3.31, CI 95%, 1.64–6.68, Table 6).

Table 6. Sociodemographic, clinical and mental characteristics in groups that differ in diuretic intake and test results.

Feature (Variable)	He/She Is Taking Diuretics				*p*-Value	OR (95% CI)	Multivariate Logistic Regression
	Yes *n* = 78		No *n* = 422				OR (95% CI)
	n	%	*n*	%			
Body weight ≥ 73 kg	61	78.2	241	57.1	<0.001	2.69 (1.52–4.77)	**2.52 (1.21–5.26)**
BMI ≥ 25.6 kg/m^2	57	73.1	249	59.0	0.022	1.89 (1.10–3.23)	0.92 (0.46–1.86)
IADL < 23 pts	27	34.6	77	18.2	0.002	2.37 (1.40–4.02)	1.63 (0.92–2.91)
MNA < 14 pts	55	70.5	234	55.5	0.017	1.92 (1.14–3.24)	1.73 (0.97–3.08)
CAD	24	30.8	39	9.2	<0.001	4.36 (2.44–7.82)	**3.31 (1.64–6.68)**
Diabetes	20	25.6	54	12.8	0.005	2.35 (1.31–4.21)	1.56 (0.83–2.96)
Heart failure	21	26.9	50	11.8	0.001	2.74 (1.53–4.90)	1.10 (0.54–2.26)

Bold for parameters significant at $p < 0.05$.

3.3. Painkillers

The painkillers drugs group showed positive linear correlations with BMI (0.112), geriatric depression scale (0.194), geriatric anxiety scale (0.243) and asthma (0.089). In contrast, the negative linear correlation was visible with education (−0.149), net income (−0.119), Instrumental Activities of Daily Living scale (−0.123), Lubben Social Network scale (−0.094), Gierveld Loneliness Scale (−0.175) and Mini Nutritional Assessment (−0.117) (Table S4). Based on multivariate logistic regression analysis, we found that independent predictors

of painkiller intake among elderly patients were BMI ≥ 25.8 kg/m^2 (p = 0.028), Geriatric Anxiety Scale ≥ 9 pts (p < 0.001), and Gierveld Loneliness Scale GLS < 13 pts (p < 0.001). Patients with BMI ≥ 25.8 kg/m^2, Geriatric Anxiety Scale ≥ 9 pts and Gierveld Loneliness Scale < 13 pts took approximately 1.5 times, 2.5 times and 2 times more often painkillers than other respondents, respectively (OR = 1.54, CI 95%, 1.04–2.29, OR = 2.59, CI 95%, 1.58–4.26 and OR = 2.08, Cl 95%, 1.38–3.13, respectively, Table 7).

Table 7. Sociodemographic, clinical and mental characteristics in groups that differ in pain medication intake and test results.

Feature (Variable)	He/She Is Taking Painkillers				*p*-Value	OR (95% CI)	Multivariate Logistic Regression
	Yes *n* = 230		No *n* = 270				OR (95% CI)
Higher education	50	21.7	92	34.1	0.003	0.54 (0.36–0.80)	0.81 (0.51–1.27)
Net income up to 2.000 PLN	116	50.4	101	37.4	0.004	1.70 (1.19–2.43)	1.47 (0.98–2.21)
BMI ≥ 25.8 kg/m^2	150	65.2	150	55.6	0.028	1.50 (1.04–2.15)	**1.54 (1.04–2.29)**
IADL < 24 pts	80	34.8	59	21.9	0.001	1.91 (1.28–2.83)	1.44 (0.93–2.23)
GDS ≥ 4 pts	138	60.0	120	44.4	0.001	1.88 (1.31–2.68)	0.84 (0.52–1.36)
GAS ≥ 9 pts	114	49.6	66	24.4	<0.001	3.04 (2.08–4.44)	**2.59 (1.58–4.26)**
LSNS < 12 pts	91	39.6	76	28.1	0.008	1.67 (1.15–2.43)	1.48 (0.96–2.28)
GLS < 13 pts	111	48.3	82	30.4	<0.001	2.14 (1.48–3.08)	**2.08 (1.38–3.13)**
MNA < 14 pts	149	64.8	140	51.9	0.004	1.71 (1.19–2.45)	1.07 (0.70–1.63)
Asthma	26	11.3	17	6.3	0.047	1.90 (1.00–3.59)	1.53 (0.76–3.09)

Bold for parameters significant at p < 0.05.

3.4. Anticoagulants

In the group of anticoagulants, a positive linear correlation was shown with household (0.107), body weight (0.189), BMI (0.152), coronary artery disease (0.287), chronic obstructive pulmonary disease (0.175), heart failure (0.342) and gastroesophageal reflux disease (0.141). In contrast, a negative linear correlation occurred with the female sex (−0.112). Based on multivariate logistic regression analysis, we found that independent predictors of anticoagulant intake among elderly patients were body weight ≥ 81 kg (p < 0.001) and heart failure (p < 0.001). Patients with body weight ≥ 81 kg and suffering from heart failure took approximately two times and 4.5 times more often anticoagulants than other respondents (OR = 2.16, CI 95%, 1.09–4.27 and OR = 4.41, CI 95%, 2.27–8.56, respectively) (Table 8).

Table 8. Sociodemographic, clinical and mental characteristics in groups that differ in anticoagulant drug intake and test results.

Feature (Variable)	He/She is Taking Anticoagulants				*p*-Value	OR (95% CI)	Multivariate Logistic Regression
	Yes *n* = 87		No *n* = 413				OR (95% CI)
Female	40	46.0	250	60.5	0.017	0.55 (0.35–0,88)	0.88 (0.51-1.53)
Lives with a partner or family	49	56.3	182	44.1	0.044	1.64 (1.03–2.61)	1.56 (0.93–2.62)
Body weight ≥ 81 kg	50	57.5	136	32.9	<0.001	2.75 (1.72–4.41)	**2.16 (1.09–4.27)**
BMI ≥ 27.2 kg/m^2	51	58.6	177	42.9	0.009	1.89 (1.18–3.02)	0.95 (0.49–1.84)
CAD	29	33.3	34	8.2	<0.001	5.57 (3.16–9.83)	1.97 (0.97–3.99)
COPD	14	16.1	19	4.6	<0.001	3.98 (1.91–8.29)	2.11 (0.89–5.01)
Heart failure	35	40.2	36	8.7	<0.001	7.05 (4.07–12.2)	**4.41 (2.27–8.56)**

Bold for parameters significant at p < 0.05.

3.5. Antidepressants

Antidepressants showed a positive linear correlation with domicile (0.091), geriatric depression scale (0.264), geriatric anxiety scale (0.249) and gastroesophageal reflux dis-

ease (0.103). In contrast, the negative linear correlation was presented with the Gierveld Loneliness Scale (−0.100) and Mini Nutritional Assessment (−0.284) (Table S5). Based on multivariate logistic regression analysis, we found that independent predictors of antidepressants intake among elderly patients were living in a city of over 400,000 inhabitants ($p = 0.008$), GAS-10 > 8 pts ($p < 0.001$) and MNA < 13 pts ($p < 0.001$). Patients living in a city of over 400,000 inhabitants, with GAS-10 > 8 pts and MNA < 13 pts took antidepressants respectively approximately 2 times, 3 times and 2.5 times more often than other respondents (OR = 2.18, CI 95%, 1.20–3.94, OR = 2.91, CI 95%, 1.49–5.70 and OR = 2.64, Cl 95%, 1.54–4.53, respectively) (Table 9).

Table 9. Sociodemographic, clinical and mental characteristics in groups that differ in antidepressant drug intake and test results.

Feature (Variable)	He/She Is Taking Antidepressants				*p*-Value	OR (95% CI)	Multivariate Logistic Regression
	Yes *n* = 78		No *n* = 422				OR (95% CI)
Lives in a city of over 400.000 inhabitants	24	30.8	73	17.3	0.008	2.12 (1.23–3.66)	**2.18 (1.20–3.94)**
GDS-15 ≥ 4 pts	61	78.2	197	46.7	<0.001	4.10 (2.32–7.25)	1.95 (0.96–3.94)
GAS-10 ≥ 8 pts	57	73.1	144	34.1	<0.001	5.24 (3.06–8.99)	**2.91 (1.49–5.70)**
GLS < 12 pts	19	24.4	57	13.5	0.024	2.06 (1.15–3.71)	1.11 (0.58–2.13)
MNA < 13 pts	48	61.5	129	30.6	<0.001	3.63 (2.20–6.00)	**2.64 (1.54–4.53)**

Bold for parameters significant at $p < 0.05$.

4. Discussion

Pharmacotherapy has become almost an inevitable element of our daily lives. Optimizing proper drug therapy for older adults remains a major challenge. According to the report by the Centers for Disease Control and Prevention 2019, approximately 83% of the US adults in their 60 s and 70 s consumed at least one prescription drug in the previous 30 days and about one-third of them used five or more medications [22]. These findings are quite similar to the Biostat report, showing that in 2019, 82.1% of the Polish population bought prescribed drugs for themselves or their relatives. This report also includes the percentage of people buying drugs available without a prescription, which was 94.6% [23]. In our study, which included 500 seniors living in Poland, all of the participants currently take at least one medication. Most of them declared taking from 1 to 3 drugs per day (301/500; 60.2%). We put efforts into identifying factors that increase the likelihood of taking more medications among the elderly population. Our results showed that patients who were treated by two or more doctors took more medicines than patients who were treated by only one doctor. This relation may appear obvious because patients with more underlying health conditions usually demand multi-specialized care and consultations with many health care providers. However, there is also a report saying that an increased number of physicians treating a patient is associated with a higher risk of unnecessary drug usage [8]. Having multiple drug prescribers is also a risk factor for drug-drug interactions and contributes to the adverse effects of polypharmacy in elderly patients [24,25]. Moreover, our results indicate that 21.8% of patients do not inform their general practitioners (GPs) about all new medicines they are taking. From this point, we would like to emphasize the need and importance of providing coordinated medical care for the patients. To obtain the necessary knowledge about patient health and treatment in use, physicians should actively reach for the necessary information by asking their patients about recent consultations with other specialists, new symptoms or changes in a treatment regimen. Comprehensive Geriatric Assessment (CGA) may also occur to be a useful tool to identify conditions with the highest priority for treatment and to optimize drug regimens in order to prevent or delay their complications. CGA was proved to be effective in decreasing the prevalence of polypharmacy and reducing the number of prescriptions and daily drug doses by de-

prescribing potentially inappropriate medications (PIMs). Moreover, patients who had undergone CGA had also optimized treatment by increasing the number of prescribed medications when potential prescribing omissions (PPOs) were observed. According to Unutmaz et al., the most common PIMs which were discontinued after comprehensive geriatric assessment were proton pump inhibitors, anti-dementia drugs and antipsychotics, while the most common PPOs started with vitamins D and B12 as well as antidepressants. After such interventions, the financial cost of treatment was also reduced [26,27].

According to our study, 378 surveyed people bought medications or supplements without a prescription (378/500; 75.6%). However, mixing OTC drugs with drugs prescribed by primary care physicians may handicap controlling the progress of the disease and the efficacy of the treatment. Moreover, self-medicating may potentially increase the incidence of a prescribing cascade when, unintentionally, a new drug is used to reduce the adverse effects of another drug prescribed to the patient. It is also possible that by self-medicating, patients will mask the presence of symptoms that require further investigation and defining a reason of their occurrence. Furthermore, an increased number of taken drugs enhances the likelihood of skipping medications essential for treatment or using incorrect drug dose. This is especially important in the elderly patients, who generally have more troubles with memory and concentration than their younger counterparts [28]. Abusing prescribed medications as well as a wrong dosage, increase the risk of adverse drug effects including headache, nausea and vomiting, dizziness, excessive sweating, bleeding or cognitive impairment [29]. Due to changes in body metabolism progressing with age and, as a consequence, changes in drugs pharmacokinetics and pharmacodynamics, older people often need to adjust doses of certain drugs or demand fewer daily doses, what puts them at a higher risk of adverse drug reactions. Inappropriate usage of drugs may prolong the drug's effect and increase the risk of side effects [30].

Moreover, we observed that respondents with higher body weight and subsequent higher BMI values, representing overweight groups, were more likely to consume more medications per day (BMI > 25.9 kg/m^2–OR = 2.68, CI 95%, 1.50–4.77), especially antihypertensive drugs (BMI $\geq$ 29.0 kg/m^2–OR = 3.12, CI 95%, 1.85–5.27), diuretics (body weight $\geq$ 73 kg–OR = 2.52, CI 95%, 1.21–5.26), painkillers (BMI $\geq$ 25.8 kg/m^2–OR = 1.54, CI 95%, 1.04–2.29) and anticoagulants (body weight $\geq$ 81 kg–OR = 2.16, CI 95%, 1.09–4.27). As obesity greatly increases the risk of different chronic disease incidence and mortality (diabetes, cardiovascular diseases, depression, certain cancers, etc.), it is reasonable that overweight people take more drugs [31]. This observation indicates the importance of adequate and broad lifestyle education and the need to maintain the proper balance between the quality and number of calories consumed with foods and beverages and patients' energy requirements, including recommended physical activity, to prevent excessive weight gain. Such efforts will decrease the risk of chronic disease incidence and mortality and reduce the number of medications taken [32].

Surveyed patients were also asked to answer the questions regarding mental health conditions. We found that people with low mental levels are more likely to take drugs for hypertension (as shown on the AMTS scale; OR = 1.70, CI 95%, 1.04–2.78). Several studies proved that depression and hypertension share common pathways [33–35]. Therefore, our findings confirm these analyses; antihypertensive drug consumption testifies the existence of the disease that is additionally intensified among those with depression. Furthermore, patients with anxiety and social loneliness took more painkillers (as shown by the GAS-10 scale and Gierveld Scale; OR = 2.59, CI 95%, 1.58–4.26 and OR = 2.08, CI 95%, 1.38–3.13, respectively). Last but not least, antidepressants were taken more often among those with anxiety and the risk of malnutrition (as shown by the GAS scale and MNA scale OR = 2.91, CI 95%, 1.49–5.70, and OR = 2.64, CI 95%, 1.54–4.53). In these times of great anxiety and distress, special care should be given to evaluating mental health of all patients. Results of our study indicated that, according to the GDS-15 scale, more than one-third of the study group showed depressive symptoms (176/500; 35.2%). The prevalence of depression in our study was higher than in similar publications, which may be connected

with the ongoing COVID-19 pandemic and social isolation [36,37]. Low mental levels, referred to as low energy levels, depressed mood, poor concentration, change in appetite, increase the risk of physical disorders such as stroke and other cardiovascular diseases, chronic obstructive pulmonary disease and pain [38]. Therefore, it is reasonable that patients with low mental conditions are likely to take more medications. We also found that antidepressants were more often taken among elderly patients living in a city with over 400,000 inhabitants (OR = 2.18, CI 95%, 1.20–3.94. Our result is consistent with other studies in this field, showing that the prevalence of depression and mental health disorders is higher in urban areas [39,40].

Sociodemographic and health-related factors that increase the risk of excessive consumption of drugs should be taken into account by primary care physicians who have the best possibilities to perform a coordinated care for the patient. GPs are often challenged to adjust drug prescription to the needs of each individual with regard to disease-specific clinical practice guidelines. Currently, available medications are often produced with excluded tests for older patients; they are approved in doses that may not be appropriate for older adults [41]. Many medications should be considered with caution due to the age-related changes in pharmacodynamics and pharmacokinetics (different absorption, distribution, metabolism and drug excretion). Clinical practice guidelines recommend prescribing medications for each disease. Still, in the case of older adults, it is worth using a common sense in deciding which medications should be assigned first to prevent the emergence of adverse effects and treat a particular disease [42]. In the study of Saraf et al., patients assigned after acute hospitalization to a qualified nursing facility were prescribed an average of 14 medications. One-third of them had adverse effects that could intensify the underlying geriatric syndromes [43]. Furthermore, Nightingale et al. found that among ambulatory seniors with cancer, 84% of them received five or more medications and 43% received more than 10 medications [44]. There are some tools available that may help to identify potentially inappropriate medication use, including The Beers, STOPP (Screening Tool for Older People's Prescriptions) and START (Screening Tool to Alert to the Right Treatment). According to Whitman et al., after the usage of a three-tool assessment in patients from a geriatric oncology clinic, 73% of potentially inappropriate medications were identified and deprescribed, which led to a reduction of patients' symptoms in 2/3 cases. Given the circumstances, deprescribing should be considered as a proper therapeutic intervention [45,46].

It is worth noting that awareness is the first step to prevent polypharmacy. A more systematic approach is required to tailor medication regimens to the needs of individuals [47]. Pharmacists and healthcare professionals should play an active role in educating patients regarding potential dangers of over-consuming medications and provide them with proper non-pharmacological interventions, which may relieve the symptoms and reduce the number of needed medications.

There are several limitations to our study. First of all, the cross-sectional nature of this study precluded any conclusion about causal relations; therefore, it is challenging to draw firm assumptions about the direction of exposure-outcome associations. Secondly, data were not obtained from medical documentation. All respondents were interviewed by computer-assisted telephone calls, which may increase the risk of potential biases (eg. social desirability bias). Furthermore, data were generated during the prevailing COVID-19 pandemic, which may lead to finding false, supposedly significant conclusions (e.g., financial status). Last but not least, to accurately represent the Polish adult population in our data, a stratified sampling per the voivodeships' demographic structure was used. However, target quotas for sex and age strata were implemented in each geographical region. Therefore, we are aware of the inherent limitations of quota sampling.

5. Conclusions

Polypharmacy is a constantly increasing public health problem among the elderly population. This study proved that excessive drug intake is associated with coronary artery disease, diabetes, asthma, chronic obstructive pulmonary disease, heart failure, kidney

failure and depression. Mental health conditions seem to play a significant role in the usage of antihypertensive drugs, painkillers, drugs for digestive ailments and antidepressants. Increased body weight and BMI are connected with a higher number of used medications. Our findings indicate a strong need to consider sociodemographic and health-related factors when prescribing appropriate medications for patients.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/ijerph19148766/s1, Figure S1: ROC curves and threshold values for the assessment of complex daily life activities (IADL), the assessment of anxiety in the elderly (GAS-10) and the assessment of social isolation of the elderly (LSNS-6); Figure S2: ROC curves for the logistic model as a variable classifying the subjects into the group taking more than 3 drugs a day and the area under the curve (AUC); Table S1: Characteristics of the mental traits of the respondents; Table S2: Characteristics of pharmacological treatment of the studied persons, Table S3: Mental characteristics of the respondents in groups differing in the number of medications taken, Table S4: Match relevance table; Table S5: Linear correlation coefficients between drug groups and sociodemographic, clinical and mental characteristics.

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The Assessment of Fear of COVID-19 among the Elderly Population: A Cross-Sectional Study

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Abstract: The prevailing COVID-19 pandemic has dramatically affected the mental health and well-being of individuals. This cross-sectional study aimed to assess the perceived fear of COVID-19 among older adults in Poland and identify subpopulations with the highest risk of potential mental health disorders. The study was conducted in November–December 2020 on 500 people aged ≥60 years (mean M = 67.9, standard deviation SD = 4.2). In order to collect information on participants' characteristics and COVID-19-related information, they were asked to complete a questionnaire based on recorded telephone calls. Perceived fear of COVID-19 was measured using Fear of COVID-19 Scale (FCV-19S), which ranges from 7 to 35. Multiple linear regression was performed to identify factors associated with the perceived fear of COVID-19. Our results showed that the highest level of fear of COVID-19 infection was observed among women ($p = 0.025$) and patients taking anticoagulants ($p = 0.004$). Moreover, older adults with higher anxiety levels were more likely to be fearful of COVID-19 (according to the GAS-10 scale; $p < 0.001$). These findings may help policy makers and healthcare workers to adapt and implement better mental health strategies to help the elderly fight fear and anxiety during the prevailing pandemic.

Keywords: fear; COVID-19; older adults; health anxiety; media

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1. Introduction

It has been almost 2 years since we first grappled with the COVID-19 pandemic caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Despite many attempts to reduce viral transmission, the development of vaccines, new diagnostic methods, antiviral drugs, and treatment strategies, the virus still continues to take its toll. To date, approximately 242 million people have been infected worldwide, while around 5 million of them died due to COVID-19 infection [1]. The clinical symptoms are cough, high fever, fatigue, and shortness of breath. The elderly, immunocompromised, and/or those with pre-existing chronic diseases are at the highest risk to develop severe respiratory problems, leading to multi-organ failure, pneumonia, and death.

The observed high morbidity and mortality of SARS-CoV-2 have triggered the fear of COVID-19 infection. As an example, in a survey of 44,000 participants conducted in Belgium in April 2020, the number of people who reported anxiety (20%) or depression (16%) had increased substantially compared to the survey conducted in 2018 [2].

Furthermore, changes in daily lives and behavior and the implementation of social restrictions also led older adults to have increased stress and anxiety levels affecting

their mental health conditions [3]. Studies determined four domains of fear: (1) fear of oneself or their family members getting infected, (2) fear of having economic losses and being unemployed, (3) fear of avoidance behaviors toward gaining knowledge about the pandemic, or (4) fear of making decisions on showing or not showing actions like whether to visit other family members or not, whether to look for information on death rates or not, etc. [4,5]. All these doubts may be seen by changes in sleep and eating patterns; worsening of psychiatric conditions including manifestations of passivity, impotence, resignation, exclusion, and anger in older adults; and increased rates of addictions to alcohol, tobacco, drugs, etc. [6]. Another risk factor associated with mental health concerns of COVID-19 infections is a social disconnection between older adults and their families and friends. The elderly population requires special care when it comes to adapting to new ways of medical consultations via telemedicine, as well as maintaining relationships with friends and families by internet-based technologies, e.g., video conferences [7,8]. It was also observed that mental health problems in those concerned about COVID-19 infection are often neglected in favor of psychological consultations with patients with other chronic diseases [9]. Furthermore, due to implemented social restrictions, the only possible way to update the COVID-19-related information among older adults is through media (TV, radio, newspapers). However, current media is thought to be bombarded by misinformation and false reports about the COVID-19 infection and, in turn, may cause unfounded fears among many netizens [10,11]. As older adults tend to spend more time watching television than younger counterparts, this group is at higher risk of expressing fear and anxiety of COVID-19 infection.

Elderly patients and those with pre-existing chronic diseases are at the highest risk of COVID-19 morbidity and mortality, and, hence, the fear and anxiety levels are the highest. Our previous study determined how fear of COVID-19 infection influenced the professional, social, and recreational activities in the elderly population in Poland. For instance, we determined that 10% of participants (50/500; 10%) canceled planned hospitalization due to the fear of COVID-19 infection. It was observed mainly in patients suffering from chronic heart and lung diseases [12]. This behavior further increases the risk of death, especially among the elderly population with a history of diseases. In this study, we aimed to assess the fear of COVID-19 infection in the elderly population and identify subpopulations that require special care, for instance, through counselling and/or family support.

2. Materials and Methods

2.1. Study Design

The survey was conducted in November–December 2020 during the second wave of the COVID-19 pandemic in a group of 500 people, including 290 women (58%) and 210 men (42%), aged 60 years and more (mean M = 67.9, standard deviation SD = 4.2). Respondents were asked to complete a questionnaire based on recorded telephone calls. The response rate was 40%. A stratified sampling per the demographic structure of a voivodeship was used to obtain a representative sample of the elderly population. The proper size of the sample using the following formula:

$$\text{Sample size} = \frac{Z_{1-a/2}{}^2 p(1-p)}{d^2}$$

where

$Z_{1-a/2}$ is the standard normal variate (at 5% type 1 error $p < 0.05$), -1.96;
p is the expected prevalence obtained from a pilot study, -0.4; and
d is the absolute precision-0.043.

Target quotas were set for age and gender strata in each geographical region. The interviewers were properly trained and prepared to ensure the quality and accuracy of the interview. A data collection supervisor supervised all interviews, and a study coordinator

randomly evaluated the recordings of the dialogue. The transcripts were not returned to participants for comment and/or correction nor were repeat interviews carried out. The duration of the interview ranged from 15 to 20 min. Participants provided their consent at the beginning of the interview. No compensation was provided for participating in the study. More details regarding the study design are shown in a previously published article [12]. The study was approved by the Bioethics Committee of Wroclaw Medical University.

2.2. Explanatory Variables

In order to answer the question "Which subpopulation of elderly patients are at the highest risk of COVID-19-related fear and anxiety?", the questionnaire was divided into three sections. At first, we generated sociodemographic data from all respondents, including (1) gender (male/female), (2) age (categorized as 60–64 years; 65–69 years; 70 years and more), (3) place of residence (village; town, less than 20,000 inhabitants; town, between 20,000 to 100,000 inhabitants; town, between 100,000 to 200,000 inhabitants; town, between 200,000 to 400,000 inhabitants; town, more than 400,000 inhabitants), (4) household size (living alone, living with a partner, living with a partner and children, living with children, living with family, other situation), (5) education (primary, vocational, secondary, higher), (6) BMI (kg/m^2 calculated based on the given body weight and mass), and household income per person per month (in Polish currency (PLN): less than 500PLN, 501–1000PLN, 1001–2000PLN, 2001–3000PLN, more than 3000PLN, refusal to answer) (Table S1). The second part of the questionnaire assessed the medical data of all respondents, including chronic diseases (e.g., coronary heart disease, diabetes mellitus, asthma, COPD, heart failure, kidney failure, gastroesophageal reflux disease), the number of drugs currently taken (1 to 3, 4 to 6, 7 to 10, more than 10), and prescribed medications (such as cardiac drugs, antihypertensive drugs, diuretics, analgesics, digestive ailments drugs, anticoagulants, antidepressants, and nootropics) (Table S2). In the third section, we assessed the physical conditions of respondents by validated scales such as (1) Activities of Daily Living scale (ADL), (2) the Lawton Instrumental Activities of Daily Living scale (IADL), (3) Abbreviated Mental Test Score (AMTS), (4) geriatric depression scale (GDS-15), (5) Geriatric Anxiety Scale (GAS-10), (6) Lubben Social Network Scale (LSNS-6), (7) social loneliness scale (Gierveld Scale), and (8) Mini Nutritional Assessment (MNA) (Table S3).

2.3. Measures

To assess the fear of COVID-19 in the senior population, we used "Fear of COVID-19 Scale" (FCV-19S) [13]. Participants stated their position in a questionnaire using a five point scale, ranging from "1—strongly disagree", "3—neither agree nor disagree" to "5—strongly agree". Hence, the cumulative score ranged from 7 to 35, where the higher the score, the greater the fear of COVID-19. The answers to the Fear of COVID-19 Scale are presented in Table 1.

Participants stated their position in a questionnaire using a five-point scale (ranging from "1 = strongly disagree", "3 = neither agree nor disagree", and "5 = strongly agree"). Hence, the cumulative score ranged from 7 to 35, where the higher the scores, the greater the fear of COVID-19. The answers to the Fear of COVID-19 Scale are presented in Table 1.

Table 1. Assessment of fear of COVID-19 infection, based on FCV-19S.

Questionnaire Item, *n* (%)	Statistics
1. I am most afraid of COVID-19, Me (IQR)	4 (3–4)
Strongly disagree (1 point)	18 (3.6%)
Disagree (2 points)	55 (11.0%)
Neither agree nor disagree (3 points)	137 (27.4%)
Agree (4 points)	201 (40.2%)
Strongly agree (5 points)	89 (17.8%)
2. It makes me uncomfortable to think about COVID-19, Me (IQR)	4 (3–4)
Strongly disagree (1 point)	22 (4.4%)
Disagree (2 points)	77 (15.4%)
Neither agree nor disagree (3 points)	112 (22.4%)
Agree (4 points)	220 (44.0%)
Strongly agree (5 points)	69 (13.8%)
3. My hands become clammy when I think about COVID-19, Me (IQR)	2 (1–2)
Strongly disagree (1 point)	192 (38.4%)
Disagree (2 points)	193 (38.6%)
Neither agree nor disagree (3 points)	72 (14.4%)
Agree (4 points)	37 (7.4%)
Strongly agree (5 points)	6 (1.2%)
4. I am afraid of losing my life because of COVID-19, Me (IQR)	3 (2–4)
Strongly disagree (1 point)	73 (14.6%)
Disagree (2 points)	120 (24.0%)
Neither agree nor disagree (3 points)	179 (35.8%)
Agree (4 points)	94 (18.8%)
Strongly agree (5 points)	34 (6.8%)
5. When I watch news and stories about COVID-19 on social media, I become nervous or anxious, Me (IQR)	3 (2–4)
Strongly disagree (1 point)	44 (8.8%)
Disagree (2 points)	124 (24.8%)
Neither agree nor disagree (3 points)	142 (28.4%)
Agree (4 points)	155 (31.0%)
Strongly agree (5 points)	35 (7.0%)
6. I cannot sleep because I'm worrying about getting COVID-19, Me (IQR)	2 (1–3)
Strongly disagree (1 point)	135 (27.4%)
Disagree (2 points)	199 (39.8%)
Neither agree nor disagree (3 points)	101 (20.2%)
Agree (4 points)	49 (9.8%)
Strongly agree (5 points)	14 (2.8%)
7. My heart races or palpitates when I think about getting COVID-19, Me (IQR)	2 (1–3)
Strongly disagree (1 point)	132 (26.4%)
Disagree (2 points)	175 (35.0%)
Neither agree nor disagree (3 points)	116 (23.2%)
Agree (4 points)	63 (12.6%)
Strongly agree (5 points)	14 (2.8%)
The total assessment of fear of COVID-19 infection (total points):	
M ± SD	19.3 ± 5.6
Me (IQR)	19 (15–23)
Min–Max	7–35

2.4. Statistical Analysis

To investigate the associations between the COVID-19-related fears and sociodemographic factors, and different physical and mental health conditions among our study group, descriptive statistics were calculated for continuous quantitative variables, and the non-parametric significance tests (Mann–Whitney U test and Kruskal–Wallis H test) were applied for qualitative variables (nominal and ordinal). Adjusted beta-coefficient (β) and 95% confidence interval (95% CI) were reported for regression analysis. All analyses were performed using the statistical software package Statistica v.13.3 (TIBCO Software Inc. Palo Alto, CA, USA). The *p*-values presented in the tables take into account the Bonferroni sequential correction (Holm–Bonferroni Method). A *p*-value of <0.05 was considered to be statistically significant.

3. Results

3.1. Participants' Characteristics

The cross-sectional analysis included 500 patients (290 females, 58%, and 210 males, 42%) aged 60 and more (mean M = 67.9 ± 4.2). Most of them lived in a town, between 20,000 to 100,000 inhabitants (136/500; 27.2%), and fewer in villages (110/500; 22.0%). Including housing situation, 202 respondents lived with a partner (202/500; 40.4%). In general, most of the respondents were relatively highly educated; only eight people had a primary education (8/500; 1.6%), while 105 reported vocational education (105/500; 21.0%). Based on the given measurements of body weight and height, we calculated the body-mass index (BMI) of all participants (mean M = 27.4 ± 4.6). According to the World Health Organization (WHO) report, this result shows respondents were slightly overweight [14]. Taking into account household income per person per month, five people earned less than 500PLN (5/500; 1.0%), 24 people earned between 501PLN to 1000PLN (24/500; 4.8%), 188 people earned between 1001 to 2000PLN (188/500; 37.6%), 158 people earned between 2001 to 3000PLN (158/500; 31.6%), and 110 respondents earned more than 3000PLN (110/500; 22.0%). Furthermore, 15 respondents refused to answer this question (15/500; 3.0%). This result should be considered with caution, as, due to the restrictions, many people lost their jobs or had lowered salaries. Detailed data on the general characteristics of the surveyed people showing their sociodemographic data are presented in Table S1.

Most of the respondents suffered from one or more chronic diseases such as coronary heart disease (63/500, 12.6%), diabetes mellitus (74/500, 14.8%), asthma (43/500, 8.6%), chronic obstructive pulmonary disease (COPD) (33/500, 6.6%), heart failure (71/500, 14.2%), kidney failure (20/500, 4.0%), and gastroesophageal reflux disease (68/500, 13.6%). All participants took at least one medication regularly. Most of them took one to three drugs (301/500; 60.2%), while eight people took more than 10 medications (8/500; 1.6%). The most commonly taken medications were antihypertensive drugs (255/500, 51.0%) and analgesics (230/500, 46.0%), followed by cardiac drugs (132/500; 26.4%) and digestive ailments' drugs (131/500, 26.2%). There were 352 participants who declared the same GP doctor always prescribed all drugs (352/500; 70.4%). The remaining respondents reported different doctors have prescribed medications (148/500; 29.6%). Detailed data on the clinical characteristics of the surveyed people are presented in Table S2.

According to the ADL scale, most of the participants were fit people (493/500; 98.6%). However, according to the GDS-15 scale, a significant number of patients suffered from depression (176/500; 35.2%). They exhibited less social engagement (according to LSNS-6 scale; mean = 14.2 ± 5.9) and felt lonely (according to the Gierveld Scale, mean = 13.1 ± 1.8). Most of the participants had a proper nutritional status according to the MNA scale (418/500, 83.6%). Detailed data on the psychological characteristics of the surveyed people are presented in Table S3.

3.2. Fear of COVID-19 Infection

Many different factors contribute to the perception of fear and anxiety due to the prevailing COVID-19 pandemic, including sociodemographic factors, health conditions, and mental health. Based on the Fear of COVID-19 Scale (FCV-19S), we determined that 201 people were afraid of COVID-19 infection (201/500; 40.2%), and 89 participants were strongly afraid of COVID-19 infection (89/600; 17.8%). Eighteen people did not show any concerns about the pandemic (18/500; 3.6%); they did not care about the potential dangers of contact with other people. This result is in line with another question from FCV-19S, regarding feeling uncomfortable while thinking about COVID-19 infection. There were 220 participants who agreed (220/500; 44.0%) and 69 participants who strongly agreed with this statement (69/500; 13.8%). The fear of COVID-19 infection may be seen by the exhibition of different symptoms at different levels. Thus, other statements of FCV-19S included questions if patients' hands become clammy when thinking about COVID-19 disease or if they had insomnia or rapid heartbeat because of worrying about COVID-19.

However, according to our analysis, only 37 reported their hands become clammy when thinking about COVID-19 infection (27/500; 7.4%) and six people strongly agreed with this statement (6/500; 1.2%). Furthermore, 49 people reported suffering from insomnia, likely due to the threat of COVID-19 infection (49/500; 9.8%). For 14 people, it was obvious that insomnia was caused by the fear of getting sick (14/600; 2.8%). Fear of death caused by COVID-19 infection was observed in 94 respondents (94/500; 18.8%), and 34 people strongly agreed with this statement (34/500; 6.8%). The Fear of COVID-19 Scale also determined the impact of social media on the presence of anxiousness of COVID-19 infection. Watching news and stories regarding COVID-19 infection was the reason for the threat for 155 respondents (155/500; 31.0%). Participants' reported agreement on the seven items of FCV-19 Scale is shown in Figure 1. It is worth noting many respondents reported "Neither agree nor disagree" for all statements and questions included in the questionnaire (Table 1).

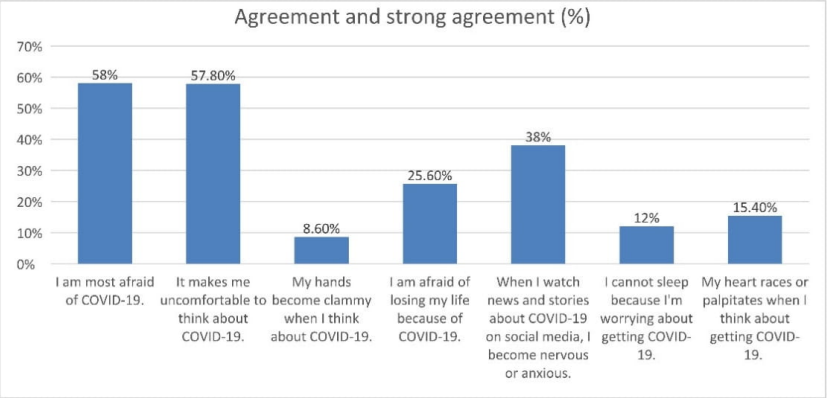

Figure 1. Participants agreement on seven items of The Fear of COVID-19 Scale (FCV-19S).

Including all sociodemographic factors analyzed in this study, we determined the most critical predictor to exhibit fear and anxiety due to COVID-19 infection in the univariate analysis was the female gender ($p = 0.025$, Table 2). Women, regardless of age, were more often concerned about contracting COVID-19 infection than men.

Table 2. Assessment of fear of COVID-19 infection in groups differing in socio-demographic characteristics, Me (IQR) [in red: the most statistically significant (p-value < 0.05) predictors of exhibiting fear of COVID-19 infection in the elderly population].

Feature (Variable)	Statistics
Gender:	
Female ($n = 290$)	20 (16–23)
Male ($n = 210$)	19 (14–22)
U Mann–Whitney test:	$p = 0.025$
Age	
60–64 ($n = 141$)	19 (15–23)
65–69 ($n = 128$)	20 (16–23)
70 and more ($n = 231$)	19 (15–23)
Kruskal–Wallis test:	$p = 0.832$
Place of residence	$p = 0.644$
Housing situation	$p = 0.597$
Education	$p = 0.397$
Household income per person per month	$p = 0.982$

Furthermore, the fear of COVID-19 infection increased in respondents with a history of coronary heart disease ($p < 0.001$), COPD ($p = 0.007$), and heart failure ($p < 0.001$) (Table 3).

Table 3. Assessment of fear of COVID-19 infection in groups differing in the disease history, Me (IQR) [in red: the most statistically significant (p-value < 0.05) predictors of exhibiting fear of COVID-19 infection in the elderly population].

Feature (Variable)	Statistics
Coronary heart disease:	
Yes ($n = 63$)	22 (18–26)
No ($n = 437$)	19 (15–22)
U Mann–Whitney Test:	$p < 0.001$
Diabetes Mellitus:	
Yes ($n = 74$)	21 (16–25)
No ($n = 426$)	19 (15–23)
U Mann–Whitney Test:	$p = 0.068$
Asthma:	
Yes ($n = 43$)	20 (16–26)
No ($n = 457$)	19 (15–23)
U Mann–Whitney Test:	$p = 0.245$
COPD:	
Yes ($n = 33$)	22 (19–26)
No ($n = 467$)	19 (15–23)
U Mann–Whitney Test:	$p = 0.007$
Heart failure:	
Yes ($n = 71$)	22 (18–26)
No ($n = 429$)	19 (15–22)
U Mann–Whitney Test:	$p < 0.001$
Kidney failure:	
Tak ($n = 20$)	23 (18–27)
Nie ($n = 480$)	19 (15–23)
U Mann–Whitney Test:	$p = 0.077$

Including clinical characteristics of all respondents, we also determined that the number of medicines taken affects the fear of COVID-19 infection levels ($p = 0.002$). The most crucial predictors to exhibit fear were found in people who take cardiac drugs (0 < 0.001), antihypertensive drugs ($p = 0.011$), analgesics ($p = 0.001$), digestive ailments drugs ($p = 0.005$), anticoagulants ($p = 0.004$), and antidepressants ($p = 0.043$) (Table 4).

Table 4. Assessment of fear of COVID-19 infection in groups differing in taken medications, Me (IQR) [in red: the most statistically significant (p-value < 0.05) predictors of exhibiting fear of COVID-19 infection in the elderly population].

Feature (Variable)	Statistics
Number of drugs currently taken	
1 to 3 (n = 301)	19 (15–22)
4 to 6 (n = 151)	21 (16–25)
7 to 10 (n = 40)	20 (16–25)
More than 10 (n = 8)	25 (20–28)
U Mann–Whitney Test:	p = 0.002
Cardiac drugs	
Yes (n = 132)	21 (17–25)
No (n = 368)	19 (15–22)
U Mann–Whitney Test:	p < 0.001
Antihypertensive drugs	
Yes (n = 255)	20 (16–24)
No (n = 368)	19 (14-22)
U Mann–Whitney Test:	p = 0.011
Diuretics	
Yes (n = 78)	20 (17–25)
No (n = 422)	19 (15–23)
U Mann–Whitney Test:	p = 0.060
Analgesics	
Yes (n = 230)	20 (16-24)
No (n = 270)	18 (15-22)
U Mann–Whitney Test:	p = 0.001
For digestive ailments drugs	
Yes (n = 131)	20 (17–24)
No (n = 369)	19 (15–22)
U Mann–Whitney Test:	p = 0.005
Anticoagulants	
Yes (n = 87)	20 (17–25)
No (n = 413)	19 (15–23)
U Mann–Whitney Test:	p = 0.004
Antidepresants	
Yes (n = 78)	20 (17–24)
No (n = 422)	19 (15–23)
U Mann–Whitney Test:	p = 0.043
To improve memory drugs:	
Yes (n = 54)	19 (16–24)
No (n = 446)	19 (15–23)
U Mann–Whitney Test:	p = 0.786
All drugs are prescribed by the same doctor	
Yes (n = 352)	19 (15–23)
No (n = 148)	19 (15–23)
U Mann–Whitney Test:	p = 0.684
How many different doctors have prescribed your medications?	
2 (n = 82)	19 (14–23)
3 (n = 52)	20 (15–23)
4 and more (n = 14)	21 (17–25)
Kruskal–Wallis Test:	p = 0.455

Including the physical state of the respondents, the fear of COVID-19 infection was primarily associated with lowered ability to perform complex activities (according to the IADL scale; p = 0.013), reduced mental acuity (according to the AMTS scale; p = 0.013),

depression (according to the GDS-15 scale; $p < 0.001$), higher anxiety levels (according to the GAS-10 scale; $p < 0.001$), social isolation (according to the LSNS-6 scale; $p = 0.006$), and loneliness (according to the Gierveld scale; $p = 0.004$). Furthermore, respondents with the danger of malnutrition and malnutrition were more concerned about contracting COVID-19 infection (according to the MNA scale; $p = 0.017$) (Table 5).

Table 5. Assessment of fear of COVID-19 infection in groups differing in physical and mental health measurements, Me (IQR) [in red: the most statistically significant (p-value < 0.05) predictors of exhibiting fear of COVID-19 infection in the elderly population].

Feature (Variable)	Statistics
Activities of Daily Living (ADL)	
Fit people ($n = 493$)	19 (15–25)
Moderately disabled people ($n = 6$)	23 (18–26)
Disabled people ($n = 1$)	34
Kruskal–Wallis Test:	$p = 0.150$
The Lawton Instrumental Activities of Daily Living (IADL)	
Fit people, ≥24 pts. ($n = 361$)	19 (15–22)
Less fit people, <24 pts. ($n = 139$)	21 (16–24)
U Mann–Whitney Test:	$p = 0.013$
Abbreviated Mental Test Score (AMTS)	
Normal condition, 7–10 pts., ($n = 491$)	19 (15–23)
Moderate disorder, 4–6 pts., ($n = 9$)	22 (18–23)
U Mann–Whitney Test:	$p = 0.013$
Geriatric depression scale (GDS-15)	
Lack of depression, 0–5 pts., ($n = 324$)	18 (15–22)
Depression, 6–15 pts., ($n = 176$)	22 (17–25)
U Mann–Whitney Test:	$p < 0.001$
Geriatric Anxiety Scale (GAS-10)	
Lower anxiety level, 0–5 pts., ($n = 210$)	17 (14–21)
Higher anxiety level, 6–25 pts., ($n = 290$)	21 (17–25)
U Mann–Whitney Test:	$p < 0.001$
Lubben Social Network Scale (LSNS-6)	
Lower, 16–30 pts., ($n = 209$)	19 (14–22)
Higher, 0–15 pts., ($n = 291$)	20 (16–24)
U Mann–Whitney Test:	$p = 0.006$
Social loneliness scale (Gierveld Scale)	
Lower, 14–18 pts., ($n = 209$)	18 (14–22)
Higher, 6–13 pts., ($n = 291$)	20 (16–23)
U Mann–Whitney Test:	$p = 0.004$
Mini Nutritional Assessment (MNA)	
Proper nutritional status, 12–14 pts., ($n = 418$)	19 (15–22)
The danger of malnutrition, 8–11 pts., ($n = 78$)	21 (17–27)
Malnutrition, 0–7 pts., ($n = 4$)	21 (16–24)
Kruskal–Wallis Test:	$p = 0.017$

A multivariate regression analysis was performed to select independent predictors of a high expected fear of COVID-19. Its results are presented in Table 6. The most crucial predictors to exhibit higher fear of COVID-19 infection levels are (1) female gender ($p = 0.007$), (2) anticoagulants ($p = 0.041$), and (3) anxiety levels (according to the GAS-10 scale; $p < 0.001$) (Table 6).

Table 6. Values of regression coefficients for the assessment of fear of COVID-19 infection with predictors significant in the univariate analysis [in red: the most statistically significant (p-value < 0.05) predictors of exhibiting fear of COVID-19 infection in the elderly population].

Predictors of Fear of COVID-19 Infection	b	p	Beta	p
Female gender	1.24	0.015	0.124	0.007
Coronary heart disease	2.52	0.001	-	>0.05
COPD	2.54	0.012	-	>0.05
Heart failure	2.54	<0.001	-	>0.05
The number of currently taken medicines	1.27	<0.001	-	>0.05
Cardiac drugs	2.08	<0.001	-	>0.05
Antihypertensive drugs	1.33	0.008	-	>0.05
Analgesics	1.66	0.001	-	>0.05
Digestive ailments' drugs	1.64	0.004	-	>0.05
Anticoagulants	2.02	0.002	0.095	0.041
Antidepressants	1.23	0.078	-	>0.05
The Lawton Instrumental Activities of Daily Living (IADL)	−0.263	0.015	-	>0.05
Abbreviated Mental Test Score (AMTS)	−0.110	0.678	-	>0.05
Geriatric depression scale (GDS-15)	0.444	<0.001	-	>0.05
Geriatric Anxiety Scale (GAS-10)	0.473	<0.001	0.359	<0.001
Lubben Social Network Scale (LSNS-6)	−0.127	0.003	-	>0.05
Social loneliness scale (Gierveld Scale)	−0.481	<0.001	-	>0.05
Mini Nutritional Assessment (MNA)	−0.680	<0.001	-	>0.05

b, linear regression coefficient; β, standardized multiple regression coefficients.

4. Discussion

The rapid spread of the COVID-19 infection throughout the world has led to the increase of mental health crises, generated by the perception of stress, anxiety, depressive symptoms, insomnia, and anger. Older adults are at the highest risk of COVID-19 morbidity and mortality. The COVID-19 fatality rate for those over 80 years of age increases five-fold [15], and, hence, it is understandable they are at a higher risk of COVID-19-related fear and stress. The findings from our study showed a significant role of COVID-19 infection in perceiving fears among the older population in Poland, with a mean fear score of 19.3 ± 5.6 on a seven-item fear scale (fear score ranged between 7 to 35) (Table 4). Furthermore, we observed a great variety in participants' agreement of the COVID-19 fear scale (Figure 1), which may result from differential emotional responses to the prevailing pandemic. This phenomenon is likely due to the lack of compliance in the mass media about SARS-CoV-2 epidemiology, routes of transmission, prevention, and/or lack of sufficient knowledge and awareness of individuals about this viral disease [16–18].

Our previous study determined that 10% of all surveyed Polish elderly population (50/500; 10%) canceled planned hospitalizations due to the fear of COVID-19 infection. Untreated for chronic diseases, COVID-19-infected patients are at an increased risk of death. Thus, despite the paradoxical sincere willingness to reduce the rate of SARS-CoV-2 transmission, such situations may adversely affect the clinical health of patients [12]. In this study, instead of highlighting the consequences of the fear during the COVID-19 pandemic (e.g., changes in behavior), we found subpopulations that are at the highest risk to exhibit health anxiety during the current pandemic.

At first, we found that women are more frequently associated with higher stress, anxiety, and depression due to potential COVID-19 infection (p = 0.025; Table 2, and p = 0.007, Table 6). This finding is consistent with other studies reporting the gender differences in behavior caused by the prevailing pandemic [19–21]. The explanation of the gender-based heterogeneity in contributing fear of COVID-19 was reported by Hosen et al. [22]. Based on the cross-sectional study, they found more irresponsible behaviors towards the COVID-19 pandemic in males, which significantly decreases their consciousness about the potential infection of the virus. In contrast, women were more inclined to adjust to government-imposed social restrictions, such as movement restrictions, covering the mouth and nose

in public places, quarantining, or using disinfectants to reduce viral transmission. This behavior results from increased consciousness and, hence, potential fears of COVID-19 infection [22]. Furthermore, women are more susceptible to social isolation [23]. During the current pandemic, more women used psychological counseling than men, and these consultations focused mainly on emotional issues [24,25]. Women, especially elderly ones, as caretakers of families, are worried about themselves and their relatives, which intensifies the fear of COVID-19 infection.

Our study indicates that the fear of COVID-19 infection increases in people with pre-existing chronic diseases, such as coronary heart disease ($p < 0.001$, Table 3), COPD ($p = 0.007$, Table 3), and heart failure ($p < 0.001$, Table 3), which is consistent with other studies [26,27]. For instance, in a study aiming to assess the levels of fear of COVID-19 infection performed by Al-Rahimi et al., the significant predictors turned out to be the type of chronic disease including Crohn disease, hypertension, and cardiovascular diseases [28]. It is very likely that COVID-19 may affect the course of the pre-existing diseases and increase mortality because the overall stress caused by the viral infection may influence the cardiac muscle [29]. Furthermore, the study from the United States also reported that around one-third of infected patients with COVID-19 had at least one chronic disease; the most common were cardiovascular diseases, followed by chronic lung diseases and diabetes [30]. Thus, these results indicate the fear of COVID-19 infection in people, especially elderly ones, with cardiac and pulmonary problems is justifiable.

Furthermore, an important predictor of the fear of COVID-19 infection is also the number of prescribed medicines. The more drugs taken every day, the higher the levels of health anxiety caused by COVID-19 infection. This was observed mainly in people taking cardiac drugs ($p < 0.001$, Table 4), antihypertensive drugs ($p = 0.011$, Table 4), analgesics ($p = 0.001$, Table 4), digestive ailments' drugs ($p = 0.005$, Table 4), anticoagulants ($p = 0.004$, Table 4), and antidepressants ($p = 0.043$, Table 4). It is worth noting that people taking anticoagulants were the most frequently concerned about contagion during the COVID-19 pandemic ($p = 0.041$, Table 6). There is mounting evidence that COVID-19 causes abnormalities in blood clotting in the veins and arteries, leading to life-threatening strokes, heart attacks, and pulmonary embolism [31]. Thus, in this case, fears of COVID-19 infection are also justifiable.

Preventive measures to reduce the spread of COVID-19 transmission (e.g., lockdowns, social distancing, mask wearing, etc.) have paradoxically caused a wide range of negative consequences, including social disconnection, mental health problems, and lifestyle changes [32], leading to increased fear levels of COVID-19 infection. The US Centers for Disease Control and Prevention (CDC) estimates that, as of June 2020, nearly one-third of US adults were suffering from anxiety or depression [33]. This result is consistent with our analysis. The fear of COVID-19 infection was increased in people with weakened mental capacity (according to AMTS scale, $p = 0.013$, Table 5) and those feeling depressed (according to the GDS-15 scale, $p < 0.001$, Table 5), lonely (according to the Gierveld Scale, $p = 0.004$, Table 5), and with high levels of anxiety (according to the GAS-10 scale, $p < 0.001$, Table 5) and social isolation (according to the LSNS-6 scale, $p = 0.006$, Table 5). It is worth noting that the highest fear of COVID-19 infection was reported in those exhibiting a high risk of anxiety ($p < 0.001$, Table 6). The current literature confirms this result. For instance, Mistry et al., conducted a cross-sectional study among 1032 older Bangladeshi adults aged $\geq$60 years. They determined that fear of COVID-19 infection was higher among those who felt socially isolated [18]. This study, together with our findings, suggests that we should pay more attention to the psychological support of the older community members during the pandemic.

The rapid spread of the COVID-19 disease leading to high daily rates of new cases and deaths together with the bombardment of information to which citizens are submitted through the media can influence the development of mood disorders. This affects mainly the elderly population, which tends to spend more time watching the media (radio, television, newspapers) than younger people. Moreover, the inability to visit loved ones and be

visited by them due to social restrictions also increases fear and anxiety [20]. According to our study, from a total of 500 patients, 190 of them declared that watching and reading news about COVID-19 on social media made them feel nervous and scared (155/500, 31.0% agreed; and 35/500, 7.0% strongly agreed with this statement) (Figure 1, Table 2). The observed relationship between media exposure and the fear of the COVID-19 infection creates opportunities for policy makers and journalists to affect excessive worries. For instance, all information about SARS-CoV-2 epidemiology, prevention, and treatment should be provided unambiguously, without sensationalism and disturbing images. Furthermore, it is crucial to advise the elderly to restrict their exposure to media coverage of the COVID-19 crisis and avoid sensational media, which may increase stress and decrease the well-being of individuals [34–36].

As we are now after the third wave of the COVID-19 pandemic (late summer and autumn 2021) and including the fact that data were collected during the second wave (November–December 2020), the question appears if there are some changes in perceiving fears due to COVID-19 infection between these two different seasons. The first wave of the COVID-19 pandemic (spring 2020) raised the alarm in society, mainly because of the lack of knowledge about the pathogenicity and routes of transmission of SARS-CoV-2. The second wave identified the country differences in incidence, prevalence, and mortality rates of COVID-19. Although there was a significant impact of developed vaccinations, the third wave further exposed varying social and financial differences in different countries [37]. Several studies focused on the characteristics of effects of viral disease in different seasons [38–41], but no study highlighted changes in perceiving fears of COVID-19 infection during different waves. For instance, Iftimie et al. reported differences in age range and severity of the disease between two periods of COVID-19 infection (March–June 2020 and July–October 2020). Patients in the second wave were younger, and the duration of hospitalizations and case fatality rates were lower than those in the first wave. Furthermore, more children, pregnant and post-partum women, and people with renal and gastrointestinal symptoms were COVID-19 infected in the second wave than in the first wave of the COVID-19 pandemic [38]. It is worth noting that the analysis of the differential perception of fear of COVID-19 infection is quite challenging because different study groups referred to different periods as waves of the COVID-19 pandemic, depending mainly on the country where the study was performed.

To reduce the fear of COVID-19, it would also be beneficial to implement effective and informative campaigns about the disease, focused on its prevention. This solution could be crucial for the elderly population, which feels defenseless to face the problematic situation of the pandemic and is afraid to be COVID-19 infected. Furthermore, older adults should be provided with support plans with effective measures to improve their standard of living, eating habits, and living conditions [20]. This strategy may contribute to enhancing their ability to cope with the prevailing pandemic. It would be advisable for clinic authorities and health professionals to instantly design and implement measures to alleviate these effects, which harm the mental health of their patients. It is already determined that those who received COVID-19-related information from health workers had lower fear scores [18]. This result shows health workers are trusted among the older population and provide information in a sympathetic manner. Thus, the role of health workers in decreasing the fear of COVID-19 infection and enhancing the well-being among the elderly population is incontestable.

Limitations

Our study has some limitations. At first, data were obtained by completing the questionnaire based on recorded telephone calls and the response rate was relatively low, 40%. The second limitation is the cross-sectional nature of the study based on self-reports. This may limit the generalizability of our results to a wider population and claims about the directionality of the results. Additionally, the authors could not assess if there were any differences between those who did and did not reply to the telephone survey as no

information regarding nonrespondents was available. Furthermore, respondents recalled answers to questions. These answers may be subject to recall bias. This increases the risk of overreporting or underreporting the actual fear of COVID-19 infection.

5. Conclusions

To the best of our knowledge, this is the first nationwide study providing important information about fear due to COVID-19 infection among Polish older adults. This study is relevant for policy makers and healthcare workers to determine subpopulations with the highest risk to react fearfully toward the prevailing COVID-19 pandemic and for journalists to be aware of the potential impact of their work.

Supplementary Materials: The following are available online at https://www.mdpi.com/article/10.3390/jcm10235537/s1. Table S1: Sociodemographic data of all surveyed respondents. Table S2: Clinical characteristics of the surveyed respondents. Table S3: Physical characteristics of the surveyed respondents.

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OŚWIADCZENIE

Oświadczam, że w pracy:

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Politechnika Wrocławska

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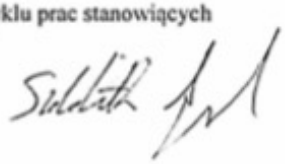

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- koordynowaniu projektu badawczego.

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ANKIETY WYKORZYSTANE W BADANIU

I. ANKIETA WŁASNA
   1. Płeć
      a. Kobieta
      b. Mężczyzna
   2. Wiek [lata]
      a. 60-64
      b. 65-69
      c. ≥ 70
   3. Miejsce zamieszkania
      a. Wieś
      b. Miasto do 20 tys. mieszkańców
      c. Miasto 20 – 100 tys. mieszkańców
      d. Miasto 100 – 200 tys. mieszkańców
      e. Miasto 200 – 400 tys. mieszkańców
      f. Miasto > 400 tys. mieszkańców
   4. Sytuacja rodzinna
      a. Mieszkam sam(a)
      b. Mieszkam z partnerem
      c. Mieszkam z partnerem i dziećmi
      d. Mieszkam z dziećmi
      e. Mieszkam z innymi członkami rodziny
      f. Inna sytuacja
   5. Wykształcenie
      a. Podstawowe
      b. Zawodowe
      c. Średnie
      d. Wyższe
   6. Masa ciała [kg]
   7. Wzrost [cm]
   8. Miesięczny dochód na osobę w rodzinie
      a. < 500 PLN
      b. 501 – 1000 PLN

c. 1001 – 2000 PLN
d. 2001 – 3000 PLN
e. > 3000 PLN
f. Odmowa odpowiedzi

9. Czy choruje Pan(i) na którąś z poniższych chorób:
   a. Choroba wieńcowa
   b. Cukrzyca
   c. Astma
   d. Przewlekła obturacyjna choroba płuc
   e. Niewydolność serca
   f. Niewydolność nerek
   g. Refluks żołądkowo – przełykowy (stwierdzony przez lekarza)
10. Czy szczepił(a) się Pan(i) przeciw grypie w 2019 roku? TAK/NIE
11. Czy szczepił(a) się Pan(i) przeciw grypie w 2020 roku? TAK/NIE
12. Czy unika Pan(i) szczepienia z powodu ewentualnych powikłań? TAK/NIE
13. Czy chciał(a) się Pan(i) zaszczepić przeciw grypie, ale było to trudne z powodu braku szczepionki w aptekach? TAK/NIE
14. Czy lekarz POZ zalecał Panu(i) szczepienie przeciw grypie oraz pneumokokom? TAK/NIE
15. Czy wie Pan(i) o refundacji szczepionki przeciw grypie dla seniorów TAK/NIE
16. Ile leków zażywa Pan(i) aktualnie?
17. Do której grupy należą zażywane przewlekle leki?
    a. Leki na nadciśnienie tętnicze
    b. Diuretyki
    c. Leki przeciwbólowe
    d. Antykoagulanty
    e. Leki przeciwdepresyjne
18. Czy wszystkie leki przepisał Panu(i) ten sam lekarz? TAK/NIE
19. Jeśli nie, ilu lekarzy przepisało Panu(i) zażywane leki?
    a. 1
    b. 2
    c. 3
    d. 4
    e. ≥ 5

20. Czy informuje Pan(i) lekarza rodzinnego o wszystkich nowych lekach? TAK/NIE
21. Czy kupuje Pan(i) leki/suplementy dostępne bez recepty? TAK/NIE
22. Proszę podać, jakie leki/suplementy kupuje Pan(i) bez recepty:
    a. Leki przeciwbólowe (paracetamol, ibuprofen, kwas acetylosalicylowy, metamizol, ketoprofen, diklofenak)
    b. Leki na zgagę (inhibitory pompy protonowej, np. omeprazol, pantoprazol)
    c. Zioła (np. dziurawiec, żeń-szeń, miłorząb japoński, Ginko biloba)
    d. Witaminy (C, B, D)
    e. Inne (magnez, potas, wapń, cynk, selen)

II. SKALA LĘKU PRZED ZAKAŻENIEM COVID-19 (FCS-19S)

[za: Fear of COVID-19 Scale Ahorsu, D. K., Lin, C. Y., Imani, V., Saffari, M., Griffiths, M. D., & Pakpour, A. H. (2020). The Fear of COVID-19 Scale: Development and Initial Validation. International Journal of Mental Health and Addiction, 1–9.]

Oceń własne odczucia, stosując skalę od 1-5, gdzie:

1 pkt = zdecydowanie się nie zgadzam

2 pkt = nie zgadzam się

3 pkt = trudno powiedzieć

4 pkt = zgadzam się

5 pkt = zdecydowanie się zgadzam

1. Bardzo się obawiam zakażenia wirusem COVID-19.
2. Niepokoi mnie myślenie o COVID-19.
3. Pocą mi się dłonie na myśl o COVID-19.
4. Obawiam, że stracę życie z powodu COVID-19.
5. Oglądanie i czytanie wiadomości i historii o COVID-19 w mediach powoduje, że czułem(am) się zdenerwowany(a) i zalękniony(a).
6. Myślenie o zagrożeniu COVID-19 powodowało u mnie bezsenność.
7. Myśl o ryzyku zachorowania na COVID-19 powodowało przyspieszenie lub nierówne bicia serca.

III. SKALA OCENY PODSTAWOWYCH CZYNNOŚCI ŻYCIA CODZIENNEGO

(ADL - Activities of Daily Living) [za: Katz, S.; Ford, A.B.; Moskowitz, R.W.; Jackson, B.A.; Jaffe, M.W. Studies of illness in the aged. The Index of ADL: A standarized measure of biological and psychosocial function. JAMA 1963, 185, 914–919.]

1. Czy Pan(i) samodzielnie się kąpie? TAK/NIE
2. Czy Pan(i) samodzielnie ubiera się i rozbiera? TAK/NIE
3. Czy Pan(i) samodzielnie korzysta z toalety (dojście, rozebranie, ubranie, powrót)? TAK/NIE
4. Czy Pan(i) samodzielnie przemieszcza się z łóżka na fotel i z powrotem? TAK/NIE
5. Czy Pan(i) samodzielnie spożywa posiłki? TAK/NIE
6. Czy Pan(i) całkowicie kontroluje zwieracze (oddawanie moczu i stolca)? TAK/NIE

IV. SKALA OCENY ZŁOŻONYCH CZYNNOŚCI ŻYCIA CODZIENNEGO

(IADL – Instrumental Activity of Daily Life)

[za: Lawton, M.P.; Brody, E.M. Assessment of older people: Self-maintaining and instrumental activities of daily living. Gerontologist 1969, 9, 179–186.]

1. Czy potrafisz korzystać z telefonu?
   a. bez pomocy odbieram i wybieram rozmowy (3 pkt)
   b. wybieram tylko kilka znanych numerów (2 pkt)
   c. zupełnie nie jestem w stania korzystać (1 pkt)
2. Czy jesteś w stanie korzystać ze środków transportu miejskiego?
   a. bez pomocy korzystam i /lub kieruję własnym samochodem (3 pkt)
   b. korzystam tyko z taksówek albo z transportu miejskiego z drugą osobą (2 pkt)
   c. zupełnie nie jestem w stanie podróżować (1 pkt)
3. Czy wychodzisz na zakupy po artykuły spożywcze?
   a. bez pomocy, po dowolne artykuły (3 pkt)
   b. z niewielką pomocą lub tylko po drobne sprawunki (2 pkt)
   c. zupełnie nie jestem w stanie robić jakichkolwiek zakupów (1 pkt)
4. Czy możesz samodzielnie przygotować sobie posiłki?
   a. bez pomocy potrafię przygotować i podać dowolne posiłki (3 pkt)
   b. z niewielką pomocą (2 pkt)
   c. nie jestem w stanie (1 pkt)

5. Czy możesz samodzielnie wykonywać prace domowe (np. sprzątanie)?
   a. bez pomocy, poza bardzo ciężkimi czynnościami (3 pkt)
   b. z niewielką pomocą lub tylko drobne czynności, jak mycie naczyń, ścielenie łóżka (2 pkt)
   c. zupełnie nie jestem w stanie utrzymać porządku w domu (1 pkt)
6. Czy możesz samodzielnie wyprać swoje rzeczy?
   a. bez pomocy wszystkie osobiste rzeczy (3 pkt)
   b. z niewielką pomocą lub tylko drobne przepierki (2 pkt)
   c. nie jestem w stanie nic wyprać (1 pkt)
7. Czy samodzielnie przygotowujesz i przyjmujesz leki?
   a. przyjmuję właściwe leki o właściwych porach (3 pkt)
   b. zażywam leki, jeśli są wcześniej przygotowane (2 pkt)
   c. nie jestem w stanie zarządzać zażywaniem leków (1 pkt)
8. Czy samodzielnie gospodarujesz pieniędzmi?
   a. bez pomocy opłacam rachunki w banku lub przez Internet (3 pkt)
   b. potrafię zaplanować tylko wydatki na jeden dzień, potrzebuję pomocy w rachunkach (2 pkt)
   c. nie jestem w stanie samodzielnie zarządzać pieniędzmi (1 pkt)

V. GERIATRYCZNA SKALA OCENY DEPRESJI (GDS-15 – Geriatric Depression Scale)

[za: Yesavage, J.A.; Brink, T.L.; Rose, T.L.; Lum, O.; Huang, V.; Adey, M.B.; Leirer, V.O. Development and validation of a geriatric depression screening scale: A preliminary report. J. Psychiatr. Res. 1983, 17, 37–49.]

Proszę ocenić swoje samopoczucie w ciągu ostatnich 2 tygodni.

1. Czy jest Pan/Pani zadowolona z całego swojego życia? TAK (0 pkt) / NIE (1 pkt)
2. Czy zmniejszyły się Pana/Pani zainteresowania i/lub ilość zajęć?
   TAK (1 pkt) / NIE (0 pkt)
3. Czy ma Pan/Pani poczucie pustki w życiu? TAK (1 pkt) / NIE (0 pkt)
4. Czy często czuje się Pan/Pani znudzony/a? TAK (1 pkt) / NIE (0 pkt)
5. Czy zwykle jest Pan/Pani pogodny/a? TAK (0 pkt) / NIE (1 pkt)
6. Czy obawia się Pan/Pani, że stanie się z Panem/Panią coś złego?
   TAK (1 pkt) / NIE (0 pkt)

7. Czy przez większą część czasu czuje się Pan/Pani szczęśliwa?
   TAK (0 pkt) / NIE (1 pkt)
8. Czy często czuje się Pan/Pani bezradna? TAK (1 pkt) / NIE (0 pkt)
9. Czy woli Pan/Pani zostać w domu niż wyjść i spotkać się z ludźmi?
   TAK (1 pkt) / NIE (0 pkt)
10. Czy uważa Pan/Pani, że ma więcej kłopotów z pamięcią niż inni?
    TAK (1 pkt) / NIE (0 pkt)
11. Czy uważa Pan/Pani, że wspaniale jest żyć? TAK (0 pkt) / NIE (1 pkt)
12. Czy czuje się Pan/Pani gorszy od innych ludzi? TAK (1 pkt) / NIE (0 pkt)
13. Czy czuje się Pan/Pani pełen/na energii? TAK (0 pkt) / NIE (1 pkt)
14. Czy uważa Pan/Pani, że sytuacja jest beznadziejna? TAK (1 pkt) / NIE (0 pkt)
15. Czy myśli Pan/Pani, że większości ludzi wiedzie się lepiej niż Panu/Pani?
    TAK (1 pkt) / NIE (0 pkt)

VI. SKRÓCONY TEST SPRAWNOŚCI UMYSŁOWEJ

(AMTS - Abbreviated Mental Test Score)

[za: Hodkinson, H.M. Evaluation of a mental test score for assessment of mental impairment in the elderly. Age Ageing 1972, 1. Available online: http://ageing.oxfordjournals.org/cgi/reprint/1/4/233]

1. Ile ma Pan(i) lat?
2. Która jest godzina? (należy podać z dokładnością do 1 godziny)
3. Proszę powtórzyć podany adres: ul. Spółdzielcza 42, Wrocław.
4. Który mamy rok?
5. Jaki jest Pan(i) adres?
6. Kiedy się Pan(i) urodziła? (pełna data)
7. W którym roku rozpoczęła się II Wojna Światowa?
8. Jak nazywa się prezydent Polski?
9. Policz wspak od 20 odejmując 1
10. Proszę przypomnieć adres, który wcześniej podałam.

VII. GERIATRYCZNA SKALA LĘKU (GAS-10 – Geriatric Anxiety Scale)

[za: Segal, D.L.; June, A.; Payne, M.; Coolidge, F.L.; Yochim, B. Development and initial validation of a self-report assessment tool for anxiety among older adults: The Geriatric Anxiety Scale. J. Anxiety Disord. 2010, 24, 709–714.]

Wskaż, jak często doświadczyłeś każdego objawu w ostatnim tygodniu, w tym dziś.

0 pkt = nigdy

1 pkt = czasami

2 pkt = przez większość czasu

3 pkt = cały czas

1. Byłem poirytowany.
2. Czułem się odizolowany od innych.
3. Czułem się skołowany.
4. Trudno mi było siedzieć spokojnie.
5. Nie mogłem opanować martwienia się.
6. Czułem się niespokojny lub w sytuacji bez wyjścia.
7. Czułem się zmęczony.
8. Moje mięśnie były napięte.
9. Czułem, że nie mam kontroli nad swoim życiem.
10. Czułem, że stanie się ze mną coś strasznego.

VIII. SKALA SAMOTNOŚCI (GLS – Gierveld Loneliness Scale)

[za: De Jong Gierveld, J.; Kamphuis, F. The development of a Rasch-type loneliness scale. Appl. Psychol. Meas. 1985, 9, 289–299.]

1. Doświadczam ogólnego poczucia pustki. TAK / MNIEJ WIĘCEJ / NIE
2. Jest wielu ludzi, na których mogę polegać, kiedy mam problemy.
   TAK / MNIEJ WIĘCEJ / NIE
3. Jest wielu ludzi, którym mogę całkowicie zaufać. TAK / MNIEJ WIĘCEJ / NIE
4. Brakuje mi ludzi w pobliżu. TAK / MNIEJ WIĘCEJ / NIE
5. Jest wystarczająco dużo ludzi, z którymi czuję się blisko.
   TAK / MNIEJ WIĘCEJ / NIE
6. Często czuję się odrzucony. TAK / MNIEJ WIĘCEJ / NIE

IX. SKALA IZOLACJI SPOŁECZNEJ LUBBENA

(LSNS-6 – Lubben Social Network Scale)

[za: Lubben, J. Assessing social networks among elderly populations. Fam. Community Health 1988, 11, 42–52.]

1. RODZINA

   Biorąc pod uwagę osoby, z którymi jesteś spokrewniony:

   a. Ilu krewnych widzisz lub słyszysz przynajmniej raz w miesiącu?
   b. Ilu krewnych masz, z którymi możesz rozmawiać o sprawach prywatnych?
   c. Ilu krewnych wydaje Ci się bliskich, abyś mógł poprosić ich o pomoc?

2. PRZYJACIELE

   Biorąc pod uwagę wszystkich twoich przyjaciół:

   a. Ilu przyjaciół widzisz lub słyszysz przynajmniej raz w miesiącu?
   b. Ilu masz przyjaciół, z którymi swobodnie możesz rozmawiać o sprawach prywatnych?
   c. Ilu przyjaciół wydaje Ci się bliskich, że mógłbyś poprosić ich o pomoc?

0 pkt = zero
1 pkt = jeden
2 pkt = dwa
3 pkt = trzy lub cztery
4 pkt = pięć do ośmiu
5 pkt = dziewięć i więcej

X. SKALA ODŻYWIENIA (MNA – Mini Nutritional Assessment)

[za: Guigoz, Y.; Vellas, B.; Garry, P.J. Mini Nutritional Assessment: A practical assessment tool for grading the nutritional state of elderly patients. Facts Res. Gerontol. 1994, 4 (Suppl. 2), 15–59.]

1. Czy przyjmowanie pokarmów w okresie ostatnich trzech miesięcy zmniejszyło się z powodu utraty apetytu, problemów z trawieniem, żuciem czy połykaniem?
   a. w dużym stopniu (0 pkt)
   b. w umiarkowanym stopniu (1 pkt)
   c. nie zaobserwowano (2 pkt)

2. Utrata masy ciała w ostatnich trzech miesiącach:
    a. więcej niż 3 kg (0 pkt)
    b. badana osoba nie wie, nie potrafi sprecyzować (1 pkt)
    c. utrata masy ciała 1-3 kg (2 pkt)
    d. bez utraty masy ciała (3 pkt)
3. Mobilność / zdolność do samodzielnego przemieszczania się:
    a. nie opuszcza sam (sama) łóżka lub krzesła (0 pkt)
    b. jest w stanie sam (sama) podnieść się z łóżka lub krzesła, lecz nie wychodzi na zewnątrz (1 pkt)
    c. wychodzi samodzielnie z domu (2 pkt)
4. Czy w ciągu trzech ostatnich miesięcy wystąpiła u Pan(i) choroba o przebiegu ostrym lub stres o znacznym nasileniu?
    a. tak (0 pkt)
    b. nie (2 pkt)
5. Problemy neuropsychologiczne:
    a. znacznego stopnia demencja lub depresja (0 pkt)
    b. umiarkowanego stopnia demencja lub depresja (1 pkt)
    c. bez problemów psychologicznych (2 pkt)
6. wskaźnik masy ciała (BMI body mass index):
    a. BMI < 19 (0 pkt)
    b. BMI ≥ 19 i < 21 (1 pkt)
    c. BMI ≥ 21 i < 23 (2 pkt)
    d. BMI ≥ 23 (3 pkt)