Assessment of dietary habits and lifestyle among people with HIV

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Abstract

Background. The aim of this study was to determine the consumption of specific food groups by people with HIV and to determine the quality of their diets.

Objectives. To assess the relationship between selected eating habits and lifestyles of people infected with HIV. The research was conducted at the HIV/AIDS Preventative and Therapeutic Clinic of the Infectious Disease Prevention and Therapy Center at Wrocław Health Center (SPZOZ Wrocław), Poland.

Material and methods. The study was conducted in 2019 among 31 patients of a counselling center in Wrocław. To determine the frequency of food consumption and eating habits, the KomPAN® questionnaire, prepared by employees of the Polish Academy of Sciences, was used.

Results. All study participants were characterized by a small degree of unhealthy features in their diets; 87% of the respondents also demonstrated a small degree of healthy features in their diets, although the responses they gave showed that they assessed their nutritional knowledge and diet highly. Consumption of sweet snacks and adding salt to cooked meals were prevalent. The respondents took part in moderate physical activity and rarely consumed highly processed fast food products, though they ate fish and legumes – an important part of the diet – with similar frequency.

Conclusions. More attention should be given to the nutritional issues of patients treated for HIV, and emphasis should be placed on promoting healthy eating habits among this population. In the scientific literature, few such studies are available that address issues related to the diet of HIV-infected people.

Key words: lifestyle, quality index, eating behavior, nutrition in HIV, KomPAN

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Introduction

Researchers eagerly use nutritional questionnaires to assess subjects' eating habits, due to the low cost and simplicity.[1] Their convenience is obvious, especially for the respondents: they can answer the questions at any time. Therefore, such questionnaires are a very useful tool for studying the lifestyles of populations who for various reasons try to minimize contact with others, as in the case of patients with human immunodeficiency virus (HIV). It is a retrovirus and a type of lentivirus (*Lentiviridae*) which causes long-term infections, leading to chronic diseases and, consequently, to death.[2]

Until now, it has not been possible to find a drug that would definitively terminate the development of this infection in the human body; however, the antiretroviral treatment (ARV) significantly reduces the multiplication of the virus, halting the weakening of the immune system and – in the case of people who follow ARV treatment – slowly rebuilding its functioning. At the very beginning, HIV infection presents with very uncharacteristic symptoms, so it is very rarely diagnosed during primary HIV infection. Only after the "window period" has passed, i.e., the period from infection to the formation of anti-HIV antibodies in the blood – which usually lasts about 3 months – can the infection be diagnosed. If started early enough, ARV therapy prevents the occurrence of AIDS, so that the infected person can enjoy a long life (as long as an uninfected person), if only the daily medication intake regime is strictly followed.[3]

The HIV infection does not require a complete change in eating habits. However, paying attention to rational nutrition and the supply of essential nutrients is important. Meals should be varied and provide sufficient energy. The main aim of nutritional therapy should be to determine the amounts and variety of the foods consumed, which, apart from satisfying nutritional needs, should provide an adequate supply of the vitamins and minerals that benefit patient's health.[11] It has been confirmed that the recommendation of a higher intake of certain nutrients is justified, because it reduces the risk of full-blown AIDS. Such ingredients include vitamins A, B6, B12, C, and E, magnesium, iron, selenium, and zinc.[4]

Currently in Poland, the care of a patient with HIV is mainly focused on pharmacotherapy, marginalizing the issues related to proper nutrition.[5,6] However, several studies have confirmed that nutrition impacts the absorption and metabolism of drugs; therefore, the nutrition issue should receive more interest.[6] In Poland, only few studies and some time ago have been carried out on the diets of people with HIV.[7,8] More recent research frequently focuses on only one issue, without assessing the intake of various food groups.[9] There are recommendations for increasing the consumption of some product groups and limiting the consumption of others. However, due to the lack of control over patients' diets, it cannot be clearly stated whether those with HIV are aware of the nutritional recommendations made for them.[4,10] The aim of the study was to conduct a survey among seropositive people aged 16–65 years using a questionnaire (KomPAN v. 1.2[11]) to study their nutritional views and habits. The results of this study would determine the consumption of specific food groups and assess diet quality using diet quality indicators, according to the data development procedure,[12] and also help determine whether patients present proper eating habits and which most common mistakes they make in terms of consuming specific food groups.

Material and methods

Material

The study involved 31 patients of the HIV/AIDS Preventative and Therapeutic Clinic of the Infectious Disease Prevention and Therapy Center at Wrocław Health Center (SPZOZ Wrocław) in Poland. The consent to conduct the research was issued by the Bioethics Committee at the Wroclaw Medical University (approval No. KB-326/2019). The study group consisted of men (n = 31) who had been infected with HIV through sexual contact with other men. Recruitment was performed at the Outpatient Clinic during patients' conversations with the doctors working there. During their periodic visits, the patients were informed about the purpose and scope of the tests, the voluntary nature of their participation and the possibility of resigning from the research at any time. In order to ensure anonymity, each study participant received their own code consisting of the letters "GB" and numbers ranging from 1 to 250. The research was conducted in March–May 2019. The participants were asked to fill out the nutritional questionnaire and return it in pre-addressed envelopes.

The KomPAN questionnaire

The questionnaire used to assess patients' views and eating habits had 2 versions – one was used by the interviewer for questioning and the other was adapted for the participant to complete on his own. The questionnaire consisted of 4 parts:

– Part A, with questions about eating habits;
– Part B, with questions about the frequency in which individual food groups were consumed;
– Part C, regarding the participant's views on food and nutrition; and
– Part D, with questions about lifestyle and patient data.[12]

The participants were asked to complete the KomPAN questionnaire given to them, stating that they did not have to fill in Part C, since the scope of the research did not cover the respondents' views on food.

Based on the responses, it was possible to develop 2 dietary quality indicators: the healthy diet-10 index (pHDI-10) and the unhealthy diet-14 index (nHDI-14). The healthy

Table 1. Combining the 2 questions regarding physical activity[12]

Physical activity at work/school	Physical activity in free time		
	low (predominantly sitting, watching TV, reading newspapers or books, light housework, or walking; 1–2 h a week)	moderate (walking, cycling, gymnastics, or other light physical activity; 2–3 h a week)	high (cycling, jogging, and other recreational sports activities requiring physical effort; over 3 h a week)
Low (more than 70% of the time sitting)	low	low	moderate
Moderate (about 50% of the time sitting and about 50% of the time moving)	low	moderate	moderate
High (about 70% of the time moving or doing physical work requiring heavy effort)	moderate	moderate	high

diet index included questions regarding the consumption of the following food groups: whole-meal bread, buckwheat, oatmeal, whole-grain pasta, or other coarse cereals, milk (including flavored milk, cocoa, and coffee with milk), fermented dairy drinks, cottage cheese (including homogenized cheese and cottage cheese desserts), poultry, fish, legumes, and fruit and vegetables.[12]

The nHDI-14 index was calculated based on the frequency in which the following product groups were consumed: light bread (e.g., wheat, rye, mixed wheat-rye, toasted bread, rolls, croissants, white rice, plain pasta, or small groats), fast food, meat- or flour-based fried foods, butter as an addition to bread or dishes for frying, baking, etc., lard as an addition to bread or dishes for frying, baking, etc., cheese (including processed cheese and blue cheese), cold cuts, processed sausages or frankfurters, red meat, sweets and other confectionery, canned meat, sweetened carbonated or non-carbonated drinks, energy drinks, and alcoholic beverages.[12]

Individual responses to the questionnaire were assigned the following values: 0 – never, 0.06 – 1–3 times a month, 0.14 – once a week, 0.5 – several times a week, 1 – once daily, and 2 – several times a day. The range of results for the pHDI-10 was 0–20 points, while for the nHDI-14 it was 0–28 points. In order to unify the 2 indices and facilitate comparisons (interpretation), it was decided to recalculate the total frequency of consumption and to express the result on a scale of 0–100. A division into 3 categories of nutritional trait intensity was used: low (0–33), moderate (34–66) and high (67–100) intensity.[12]

The questionnaire also included questions about physical activity, both at work/school and in free time. Three answers could be given to these 2 questions: low, moderate or high activity.[12] Table 1 presents the method of combining the 2 variants of physical activity.

Statistical analysis

The statistical analysis was performed using STATISTICA v. 13.1 software (StatSoft Inc., Tulsa, USA). The normality of the distribution was checked using the Shapiro–Wilk test. The table also used cardinality tables and multi-tier tables. In order to check the interdependence of 2 variables, the χ^2 test was used, assuming $p < 0.05$.

Results

Participant characteristics

The study was conducted among 31 patients, whose average age was 42 years. The youngest respondent was 26 years old, while the oldest was 65 years old. Most respondents lived in a city with at least 100,000 inhabitants. There were no participants with only a basic education. Almost half (48.3%) of the respondents had a university degree. The same percentage of people described their financial situation as good. The largest group of respondents were diagnosed with HIV in the years 2016–2019 (35.5%). However, the differences in the number of people between individual years were insignificant.[34] Two patients did not specify the time when they learned about their infection. The characteristics of the study group are shown in Table 2.

Eating habits and lifestyle

Almost half (45.2%) of the respondents ate 3 meals a day. A small percentage (9.7%) reported consuming only 2 meals daily; others ate 4 or 5. All ate between meals, usually several times a week (41.9%), although there were those who snacked several times a day (29%). Most willingly declared that they ate fruit and sweet snacks between meals (87% and 64.5%, respectively). Vegetables, sweetened beverages and dairy desserts were least preferred as snacks (both variants 22.6%). For spread, they usually used butter (32.3%), although a large group did not use any fat when making sandwiches (22.6%). For frying, most chose vegetable oil (51.6%). The respondents generally did not sweeten hot drinks (41.9%), though they added salt to cooked meals and sandwiches (58.1%). Most ate out 1–3 times a month (51.6%), although there were those who ate in bars,

Table 2. Participant characteristics

Variable	Number of people (n)	%
Sex		
Male	31	100.0
Age [years]		
15–24	0	0.0
25–44	17	54.8
45–69	14	45.2
Place of residence		
Village	8	25.8
Small town (<20,000 inhabitants)	3	9.7
Town (20,000–100,000 inhabitants)	9	29.0
City (>100,000 inhabitants)	11	35.5
Financial situation of household		
We live modestly or very modestly	0	0.0
We live modestly	3	9.7
We live normally	10	32.3
We are relatively wealthy	15	48.3
We are very wealthy	3	9.7
Educational level		
Primary	0	0.0
Lower secondary	4	12.9
Upper secondary	12	38.8
Higher	15	48.3
Time from detection of infection [years]		
0–3	11	35.5
4–9	9	29.0
>10	9	29.0
No data	2	6.5

restaurants or canteens once a day or more often (13% in total). Twenty-two people were smokers, while 4 had quit smoking. Low physical activity at work or school was declared by 32.4%; moderate activity was declared by 48.4%, and high activity by 19.4%. Taking into account physical activity in free time, the percentage of those who reported moderate physical activity decreased (41.9%), while the number who assessed their activity as high was a few percentage points higher (22.6%) (Table 5). Only 1 person rated their nutritional knowledge as very good; the majority of respondents described it as good (61.3%). Others rated it as satisfactory (25.8%) or insufficient (9.7%). Seventy-one percent of people rated their diet as good, 25.8% as bad and 3.2% as very good (Table 6).

In analyzing the results concerning the influence of age, time since the initiation of treatment and time since diagnosis on the self-assessment of the patients' nutritional knowledge, a relationship was found between the time since diagnosis and the assessment of nutritional knowledge ($p = 0.03$).

When comparing the assessment of diets among the patients, no significant relationships were observed between age, time since the infection was detected and time since the start of treatment.

Light bread was chosen more often as the bread consumed daily or more than once a week in comparison to whole-meal bread (Table 3). A similar tendency was observed in the case of white rice, plain pasta, and small groats: 38.7% of respondents ate these products more than once a week, while whole-grain products and coarse cereals were eaten only by ¼ of respondents. Most frequently they consumed the latter group of products 1–3 times a month (42%). Over 1/10 of the participants (12.9%) never consumed whole grains or whole-meal bread (19.4%). Fast food was not popular among the respondents – no one reported consuming this type of food more than once a week, and more than half (51.6%) had it just 1–3 times a month. As many as 35.5% did not eat such food at all. A similar frequency of consumption as that of burgers, pizzas, fries, casseroles, and hot dogs was observed for fish – here as well 51.6% most frequently ate fish 1–3 times a month, while 6.5% did not eat it at all and 16.1% did so more than once a week.

Fruit and vegetable consumption several times a day was reported by 22.6% and 19.4% of respondents, respectively. As many as 54.8% consumed fruit once a week, and 38.7% ate vegetables that often. With the same frequency as fruit (once a day), 22.6% reached for sweets. However, most declared that they ate food from this group more than once a week. Cheese and cottage cheese were consumed once a week by 38.7% and 41.9%, respectively, but the participants were more likely to choose yellow cheese on a daily basis. Eggs were most often consumed once a week or several times a week (48.4% and 32.3%), appearing on the menu every day for one respondent. Potatoes

Table 3. Anthropometric parameters of the study group

Factor	Min	Max	M	±SD	Me
Body height	1.7	1.93	1.77	0.05	–
Body weight	60	103	75.3	13.1	–
WHR	0.86	1.06	0.96	0.05	–
Hip circumference	80.0	112.0	–	–	90.0
Waist circumference	74.0	115.0	–	–	85.5
BMI	19.6	33.3	–	–	22.4

WHR – waist-to-hip ratio; BMI – body mass index; Min – minimum; Max – maximum; M – mean; SD – standard deviation; Me – median.

Table 4. Frequency (%) of selected food consumption among participants

Food	Never	1–3 times a month	Once a week	More than once a week	Once a day	More than once a day
White bread	3.2	19.4	0	32.2	22.6	22.6
Wholemeal bread	19.4	22.6	12.9	25.8	12.9	6.4
White rice, white pasta, or fine-ground groats	0	29.0	32.3	38.7	0	0
Buckwheat, oats, wholegrain pasta, or other coarse-ground groats	12.9	42.0	16.1	25.8	3.2	0
Fried foods	12.9	35.5	19.4	29.0	3.2	0
Fast foods	35.5	51.6	12.9	0	0	0
Fish	6.5	51.6	25.8	16.1	0	0
Fruits	0	3.2	9.7	54.8	12.9	19.4
Vegetables	0	6.5	6.5	38.6	25.8	22.6
Sweets	3.2	9.7	9.7	48.4	22.6	6.4
Cheese	3.2	25.8	12.9	38.7	16.2	3.2
Eggs	0	16.1	48.4	32.3	3.2	0
Potatoes (excluding chips and fries)	3.2	25.8	19.4	41.9	9.7	0
Fruit juices, vegetable	6.4	25.8	9.7	51.6	0	6.5
Juices, fruit and vegetable juices	19.4	38.7	12.9	29.0	0	0
Poultry meat	3.2	12.9	16.1	67.8	0	0
Milk	25.8	22.6	6.4	22.6	6.5	16.1
Fermented milk beverages	3.2	29.0	16.1	35.5	9.7	6.5
Fresh cheese curd products	6.5	29.0	19.4	41.9	3.2	0
Cold meats, smoked sausages, and hot dogs	6.5	3.2	6.5	64.4	9.7	9.7
Red meat	12.9	35.5	19.4	29.0	3.2	0
Legume dishes	9.7	58.0	25.8	6,5	0	0
Canned meat	45.2	48.4	3.2	3.2	0	0
Sweetened hot beverages	29.0	6.5	0	9.7	6.5	48.3
Sweetened beverages	22.6	41.9	16.1	9.7	3.2	6.5
Energy drinks	80.6	19.4	0	0	0	0
Water	3.2	12.9	0	22.6	12.9	48.4
Alcoholic beverages	29.0	38.6	16.1	16.1	0	0

Table 5. Physical activity (% of people)

Physical activity	Low	Moderate	High
At work or school	32.3	48.4	19.4
During free time	35.5	41.9	22.6

Free-time physical activity did not depend on the time since detection of the infection ($p = 0.38$), but it did depend on the age of the respondents ($p = 0.045$). There was no significant effect of the above times on physical activity at work or at school.

Table 6. The respondents' assessment of their own nutritional knowledge and diet

Parameter	Very good	Good	Bad	Very bad
Nutritional knowledge	3.2	61.3	25.8	9.7
Diet	3.2	71.0	25.8	0.0

were also consumed more often than once a week, in a form other than chips or fries, although a large group (25.8%) consumed them 1–3 times a month.

Vegetable and vegetable–fruit juices were not very popular among the study participants – 19.4% never consumed them compared to 6.4% who never consumed fruit juices. The latter were most often consumed once a week (51.6%). Most often, the respondents had vegetable juices 1–3 times a month (38.7%), while nobody drank this type of drink more than several times a week.

As many as 67.8% ate poultry meat several times a week, nobody more often. Only one person gave up white meat completely. With similar frequency, the study participants declared consuming sausages, and frankfurters (64.5%). In the case of red meat, 12.9% of respondents never consumed it, 35.5% did so 1–3 times a month, and 29.0% several times a week. A total of 9.7% consumed it daily or several times a day, slightly less (6.5%) once a week.

In the case of milk, cocoa or flavored milk, 25.8% declared that they did not consume these products at all, 22.6% several times a week and 16.1% several times a day. Fermented dairy drinks such as yogurt and kefir, both plain and flavored, were quite popular among the respondents. It was observed that 35.5% of people consumed them several times a week, 9.7% once a day and 6.5% several times a day.

Over half of the respondents (58.1%) ate legumes and dishes containing them only 1–3 times a month; 25.8% reported eating legumes once a week, while 9.7% did not eat them at all. Canned meats were not very popular – as many as 93.6% consumed them 1–3 times a month or never. Overall, 80.6% did not consume energy drinks and nobody consumed them more often than 1–3 times a month.

Water and sweetened hot drinks such as tea, coffee or fruit/herbal teas were the most common daily drinks: both types of drinks were consumed several times a week by almost half of the respondents (48.4%). A significant number did not consume sweetened hot drinks at all (29%). Sweetened carbonated drinks were not very popular among this group of people, since 41.9% consumed them 1–3 times a month and 22.6% not at all. Alcohol was consumed most often 1–3 times a month by 38.7%; whereas 29.0% did not drink it at all. People who consumed alcohol most often reported drinking beer (45.2%).

Diet quality indices

Table 7 shows the values for the healthy and unhealthy diet indices. The average pHDI-10 result for the whole study group (21.1%) means that they show a small degree of dietary health features. On the other hand, in the case of the average nHDI-14 result, the mean value of 15.5% places them in the category of a small degree of unhealthy features. Only 4 patients had a healthy diet index above 33 points, which means their diet can be described as having a moderate degree of healthy features. None of the participants had a diet with a large degree of pro-health features. In the case of nHDI-14, the diets of all participants were qualified as diets with a small degree of unhealthy traits, i.e., none of the participants scored more than 33 points.

Using the χ^2 test, it can be observed that the time since diagnosis does not significantly affect the value of the healthy diet index ($p = 0.06$). However, the time since the start of treatment significantly affects the value of the pHDI-10 index ($p = 0.02$) (Table 8).

In the breakdown into individual periods since the detection of the infection, the highest index of a healthy diet was observed in patients who were diagnosed 10 years ago or earlier, while the lowest pHDI-10 belonged to patients with HIV diagnoses 4–9 years ago. Patients with an infection detected more than 10 years ago or earlier are also characterized by the lowest index of an unhealthy diet; this means that their diet has the smallest degree of unhealthy dietary features among all the respondents. The highest nHDI-14 index was observed among people with recent diagnoses (Table 8).

Discussion

The topic of HIV infection is currently being discussed by scientists and doctors in Poland. Along with the development of medicine around the world, research is underway whose results are supposed to provide an improvement in the nutritional status of HIV-infected patients and positively affect the functioning of their immune systems. The role of nutritional intervention is also to prevent weight loss or excessive weight gain.[13] The role of this study

Table 7. Dietary quality indices (%)

Diet index	N	M	Min	Max	Q1	Q3	SD
pHDI-10	31	21.1	3.8	48.5	12.3	30.6	11.8
nHDI-14	31	15.5	3.1	27.7	10.9	20.9	6.5

N – number; M – mean; Min – minimum; Max – maxiumum; Q1 – 1st quartile; Q3 – 3rd quartile.

Table 8. The value of dietary quality indicators depending on the time of the infection detection

Time since the infection was detected [years]	N	pHDI-10	nHDI-14
0–3	11	22.5	18.3
4–9	9	15.3	17.9
>10	9	23.4	12.9
No data	2	25.3	5.9

N – number.

was to identify the dietary habits and frequency which with individual food groups are consumed, so that in the future – in cooperation between doctors, patients and dietitians – the best solutions can be worked out, resulting in the best care for the patient not only from the attending physician, but also from representatives of other disciplines. Knowing the frequency of food intake will also shed light on the current nutritional trends of patients and, if necessary, enable undertaking nutritional intervention.

According to the currently adopted recommendations for patients infected with HIV, it is recommended to eat 4–6 meals a day, which stems from the need for a steady supply of basic nutrients from the diet.[5] Our analysis of the results shows that respondents usually eat 3 meals a day. In addition, frequent snacking between meals was observed. Snacking between meals may be caused by the low caloric value of the meals consumed or an uneven distribution throughout the day, which further confirms the belief that the recommendation of 4–6 meals a day in the diet of seropositive patients should be followed. A low number of meals is one of the basic mistakes related to nutrition, while it is worth noting here that over 61% of people described their nutritional knowledge as good or very good.

Usually, when snacking, subjects reach for fruit, but a large group of people also declared that they choose sweets. Almost half of the respondents consumed sweets several times a week, and almost 1/3 do so daily or several times a day. Therefore, the risk of not only obesity, but also other diseases such as caries, type 2 diabetes and cardiovascular diseases is higher.[14–17] Sugar consumption should be limited not only because of the abovementioned diseases, but also because ARV therapy alone causes weight gain in 30–50% of patients.[5] A large group of people add salt to cooked meals. Without recording the exact amounts of salt they add to dishes, it cannot be clearly determined whether these people consume significant amounts of salt, but taking into account the trends of Poles in the consumption of salt,[18] the addition of salt to dishes should be limited.

In the area of cereal consumption, there are no clear guidelines in Poland regarding the quantity and type of such products for people with HIV, but considering that this type of food is on one of the basic levels of the Pyramid of Healthy Nutrition and Physical Activity,[19] the selection of these products should be adapted to the recommendations of the Institute of Food and Nutrition, i.e., they should be mainly whole grains, containing more B vitamins and fiber than white bread or plain pasta.[20] It is worth mentioning that the intake of vitamins and minerals by HIV-infected patients is recommended to be 100–150% of the recommended daily intake for other adults.[5,34] In view of these recommendations, unfavorable trends can be observed among the respondents in that they consume much more white bread and processed products, such as white rice and plain pasta, than products from so-called full milling.

One very positive aspect is the subjects' avoidance or very rare consumption of fast food. In view of the generally high proportion of fats in the diet and the risk of lipid disorders in people with HIV,[21,22] it is a good sign that the respondents are limiting highly-processed fast foods. Considering the current recommendations in terms of fish consumption for healthy people,[20,33] it is worth focusing on problem of how rarely of these products are consumed. Patients should be advised to increase their fish intake due to the documented benefits of reducing low-density-lipoprotein (LDL) cholesterol and improving the overall lipoprotein profile.[22,32]

The consumption of fruit and vegetables was very low for the respondents in comparison with the current recommendations.[19,20,35] Only 1/5 of participants consumed fruit and vegetables several times a day; most reported consuming them several times a week. This is significant because vitamins and minerals have been proven many times[24,25,29] to have a positive influence on the defense mechanisms of the body. This study shows that fruit and vegetable juices were a substitute for fruit and vegetables in the daily diet of the respondents – both types were consumed several times a week, but not every day. The good news is that there was minimal consumption of energy drinks – only 1/5 consumed them 1–3 times a month, the rest never. However, the high consumption of sweetened hot drinks may be worrying. Alcoholic beverages were consumed by a total of 71%, of which over half did so 1–3 times a month. Various studies and recommendations require that virtually all alcohol be eliminated from the diet of HIV-positive patients, due to possible adverse interactions with ARV drugs.[4,5,28]

In accordance with the principles of healthy eating, adults should consume at least 2 large glasses of milk every day or replace them with fermented milk beverages. Research shows that almost a quarter do not consume milk at all, while only slightly over 21% consume milk once or several times a day. Fermented milk drinks were consumed with the same frequency by about 15% of respondents. As many as 22.6% and 29% of subjects reported consuming milk and dairy drinks only 1–3 times a month, respectively. It has been proven that people with HIV have a higher risk of bone disease: for osteopenia, the risk ranges from 22% to even 77%. Increased catabolism of vitamin D occurs with some drugs.[5,25,26,30] Therefore, dairy products should feature in the daily diet as a good source of calcium, although some scientists note that fermented dairy beverages (and raw eggs) should be limited because of the possibility of bacterial growth and their negative impact on a weakened immune system.[4,27,31]

Proper nutrition helps improve not only health, but also the quality of life of HIV-positive people. It can eliminate the occurrence of significant malnutrition in infected people as well as a deficit of minerals and vitamins with immunostimulating properties (vitamins B, A, C, and E). Proper nutrition also reduces the undesirable effects of ARV therapy (hyperglycemia and hypercholesterolemia).[5]

Although patients rated their nutritional knowledge and diet highly, this did not translate into the dietary quality

as calculated in the study. The fact that all participants displayed a small degree of unhealthy dietary features is encouraging, as it may indicate that they actually have nutritional knowledge about restricting certain products which are not recommended for their daily diet. However, the patients' own nutritional assessment does not transfer into their diet having strong features of a healthy diet. In this aspect, one should strive to make patients more aware about the importance of products included in the diet as components of a healthy dietary index.

Conclusions

Patients appraise their nutritional knowledge highly, although this does not always translate into the quality of their diet. People with a newly diagnosed infection do not pay as much attention to what they eat, which makes the average unhealthy diet index in this group much higher than in the other groups. Eating habits change with the passage of time after diagnosis, which translates into a decrease in nHDI-14 values and an increase in the proportion of products classified as having pro-health properties. Eating fruit and vegetables too rarely is also a noticeable problem, though it is satisfactory that HIV-positive people rarely eat highly processed foods.

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