SN Comprehensive Clinical Medicine (2020) 2:2221–2229
https://doi.org/10.1007/s42399-020-00512-9

MEDICINE

Analysis of Quality of Life Parameters in a Health-Promoting Program for a Population with Cardiovascular Risk Factors: a Preliminary Study

Xabier Río [1,2] · Alexander González-Pérez [2] · Arkaitz Larrinaga-Undabarrena [1,2] · Aitor Coca [1]

Accepted: 9 September 2020 / Published online: 14 September 2020

Abstract

One of the main risk factors of premature death in non-communicable diseases is physical inactivity, being as significant as hypertension, diabetes mellitus, and even smoking. It has been observed that interventions for carrying out physical activity (PA) in a communal environment have been very effective in terms of participation and adherence. The aim of this study is to prove the changes that occur on a physical level in a group of 46 patients on a regulated promotion plan for PA for health. The study consisted of a total of 15 weeks, during which a series of measurements were taken on the patients prior and post carrying out the program. There were significant changes in the undertaking of body mass index ($p = 0.006$), systolic and diastolic arterial pressure ($p = 0.03$ and $p = 0.01$, respectively), changes in attitude [degree of PA (METs, $p \leq= 0.001$)], changes in perceived quality of life (EuroQoL-VAS, $p \leq= 0.001$), as well as in the total number of risk factors (RFT, $p = 0.03$). These data confirm that a regulated program of PA is effective improving cardiovascular risk factors; improving all parameters of functional fitness studied; increasing the degree of PA; and increasing the subjective perception of patients' health. Furthermore, it is verified that carrying out these types of programs is awarded a high degree of satisfaction by the participants.

Keywords Health · Physical activity · Cardiovascular diseases · Health promoting programs

Introduction

Non-communicable diseases (NCDs) are increasing considerably [1], and they are, by a long way, the main cause of death throughout the world, killing 38 million people every year [2]. One of the main risk factors of premature death in these illnesses is physical inactivity, to which 1.6 million deaths per year are attributed [3], making it as significant risk factor as hypertension, diabetes mellitus, and even smoking [4]. Worldwide, 23% of adults and 81% of adolescents (from 11 to 17 years old) do not meet the global recommendations relative to physical activity (PA) [5].

In this context, there is a great deal of data to back up the inverse relationship between PA and cardiovascular disease (CVD), hypertension, cerebrovascular disease, osteoporosis, type-II diabetes, obesity, anxiety, and depression. These benefits have been proven in different studies, both in laboratories and in wide-scale population observation studies [6–9]. Furthermore, the positive influence of PA has been confirmed in both preliminary prevention and in the treatment of numerous illnesses, playing a role both comparable and even superior to the prescription of medicines [10, 11]. A significant advance in the amount of PA undertaken is that it is no longer necessary to accumulate a minimum of 10-min stints as recommended in the guidebooks; the most important thing is overall weekly total—the more the better—since going over the weekly recommended amount seems not to pose a health risk [12].

Therefore, PA is the principal component for the improvement of function in elderly people [13], an important affirmation due to the increase in the life expectancy at birth currently being registered globally [14]. Some researchers have gone so

This article is part of the Topical Collection on *Medicine*

✉ Xabier Río
xabier.rio@deusto.es

Alexander González-Pérez
alex.gonzalez@mugikon.com

Arkaitz Larrinaga-Undabarrena
a.larrinaga@deusto.es

Aitor Coca
aitor.coca@deusto.es

[1] Faculty of Psychology and Education, Physical Activity and Sports Sciences, University of Deusto, Avenida de las Universidades, 24, 48007 Bilbao, Spain

[2] Department of Physical Activity and Health, Mugikon, Bilbao, Spain

far as to call it a real polypill [15, 16], since it acts in a multisystemic way on the body, just like aging.

Due to such clear evidence, in recent years, the promotion of Physical Activity for Health (PAH) has become a priority objective for international organizations such as the World Health Organization (WHO) and for a range of public health systems [5, 7, 17–19].

Additionally, it must be highlighted that physical inactivity is much more than a challenge in terms of health: the economic costs it entails are enormous. On a global scale, it is calculated that physical inactivity costs US$54 billion in direct health services, of which 57% corresponds to the public sector, and an additional US$14 billion are attributable to low work productivity [5].

The involvement of a specialist guide in PAH has been shown to be of great help and effectiveness, both for promoting lifestyle changes (increasing PA levels) and educating patients about more specific aspects of PAH, such as the quantity, style, and type of beneficial activity in each case [20]. Additionally, it has been observed that interventions with homogenous groups for carrying out PA in a communal environment have been very effective in terms of participation and adherence [21, 22], and it is an effective PA promotion strategy for older adults [23].

Consequently, the objective of this study was to prove the changes that occur on a physical level: body mass index (BMI) and systolic and diastolic arterial pressure (SAP/DAP); changes on a biological level: glucose (GLU), overall cholesterol (CHO), LDL cholesterol, HDL cholesterol, and triglycerides (TRI); changes in attitude (degree of PA (METs)); changes in perceived quality of life (EuroQoL-VAS); as well as the functional fitness in a group of patients on a regulated program of promotion for PA for health developed in the Association of Txorierri (Vizcaya, Spain).

Methods

Study Design

The study comprised carrying out a program of PA for health for a total duration of 15 weeks, during which a series of measurements were taken on the patients, before and after the said program. Only those participants who attended more than 80% of the program sessions were included in this study.

Participants

The participants in the study were recruited randomly over a period of 4 weeks by the first-attending doctors in the municipalities belonging to the Association of Txorierri (Derio, Larrabetzu, Lezama, Loiu, Sondika, and Zamudio) telephonically. Patients of between 40 and 85 years of ages with two or more cardiovascular risk factors—hypertension, dyslipidemia, type II diabetes or pre-diabetes, and obesity—were identified (Table 1). Those patients eligible to join the program were selected to participate in it through a consecutive demonstration technique in control consultations for their risk factors at their health centers. The pre-selected patients were informed about the characteristics of the intervention program, and their consent for participating in it was requested. The study was approved by the University of Deusto Ethics Committee (reference # ETK-32/18-19), and written informed consent was obtained prior to study participation. The people in charge of selecting, informing, and signing people up to the program was the team of doctors described above, comprising 12 chief doctors. In this manner, a total of 67 patients were selected to participate in the program of PA. Of these, 65 (92.5%) accepted and started to participate actively in the program. However, 19 patients were eliminated from the study for not meeting the inclusion criterion based on attending a minimum of 80% of the program sessions. Therefore, the results of the study were of 46 patients, whose average age was 66.2 ± 8.0 (Table 2).

Intervention

Having been informed and given their consent, the health professionals filled out a prescription form for PA designed by Mugikon (registered intellectual property). Once selected, they were directed with the said form to the places in each municipality with the appropriate facilities to carry out the program on which were the staff qualified for designing PAH (degrees in Physical Activity Sciences and Master's in Physical Activity and Health).

With the aim of evaluating the impact of the intervention on these subjects, a series of data was taken regarding different variables before commencing the program over 15 weeks. Through the aforementioned form, data referring to the physical parameters (BMI, SAP, and DAP) and the biological parameters of the patients were provided by the chief primary care physicians in the province of Txorierri (glucose, overall cholesterol, HDL, LDL, and triglycerides). Furthermore, on both the first and last days of the program, different questionnaires were handed out about the degree of PA (weekly activity in METs) and regarding quality of life (EuroQol-VAS). Once the interview and individual and personal analysis were concluded, some functional tests were carried out to determine functional fitness. Thereafter, the subjects were scheduled to start the PAH sessions. These comprised a weekly, 90-min session (total sessions = 15) focused on working the basic physical qualities (stamina, strength, flexibility) together with coordination, joint mobility, and balance. The intensity of the proposed exercises was light to moderate, progressive, always personalized, used different materials (mats, sticks, balls, and chairs), and adapted to the abilities of each participant [9]. All

Table 1 Definition of the cardiovascular risk factors used on the study

Age	Men ≥ 45 years old; women ≥ 55 years old
Obesity	BMI ≥ 30 kg/m2
Hypertension	SAP ≥ 140 mm Hg and/or DAP ≥ 90 mm Hg(confirmed in at least two measurements)
High blood glucose	Glucose diet ≥ 100 mg/dL Oral glucose (2 h) ≥ 140 mg/dL
Dyslipidemia*	Total cholesterol ≥ 200 mg/dL o LDL ≥ 130 mg/dL o HDL < 40 mg/dL
Triglycerides	Level of triglycerides ≥ 200 mg/dL

* If HDL ≥ 60 mg/dL, this variable was not considered to be a risk factor

Adapted from: American College of Sports Medicine (2014) Manual ACSM para la valoración y prescripción del ejercicio. Barcelona: Paidotribo

the sessions were divided into three parts: the warm-up, comprising low-intensity exercises in which the body is prepared to carry out the objective of the session in the best condition possible; hard work during the main part of the session; and finally the cool down, during which the body is returned to a state of relaxation and rest.

Additionally, in accordance with the individual preferences and circumstances of each subject, individualized programs were designed and given to them to be followed autonomously during the week in addition to their controlled sessions.

Measurements

Physical Parameters

The body mass index (BMI) data, systolic arterial pressure (SAP), and diastolic blood pressure (DAP) were measured by those in charge of primary care both 1 week before starting the program and 1 week afterwards and were provided to the specialist in PA for health in the prescription form for PA.

Biological Parameters

Glucose, total cholesterol, HDL, LDL, and triglycerides were extracted before the aforementioned medical report for later statistical analysis. The analytical data provided by Osakidetza (the Basque Public Health Organization) were thereby used and with written consent from the patients, within a period of no more than 3 months before the intervention as an initial measure, and blood samples were taken from each of the patients in their respective health centers the week after the physical health program had finished.

Table 2 Characteristics of the patients before the start of the study

Variables	Patients recruited ($n = 65$)	Patients' attendance > 80% ($n = 46$)	Patients' attendance < 80% ($n = 19$)
Age	63.4 (8.7)	66.2 (8.0)	56.4 (6.0)
Sex			
Men	30 (46)	19 (41)	11 (58)
Women	35 (54)	27 (59)	8 (42)
State Pro-Di Cle			
Pre-contemplative	4 (6.2)	1 (2.2)	3 (16)
Contemplative	27 (42)	18 (40.2)	9 (47)
Action	34 (52)	27 (58.7)	7 (37)
Risk factors			
Overweight	24 (37)	19 (41)	5 (26)
Obesity	40 (62)	27 (59)	13 (68)
Hypertension	29 (45)	19 (41)	10 (53)
Glucose	37 (57)	26 (57)	11 (58)
Dyslipidemia	32 (49)	23 (50)	9 (47)
Triglycerides	20 (31)	16 (35)	4 (21)

Abbreviations: State Pro-Di Cle (classification of the patients according to the transtheoretical model of Prochaska-Di Clemente) [24]

Age is given as an average (SD); the rest of the variables are given as results

Total Risk Factors

It's considered to be the sum of the cardiovascular risk factors associated with the physical and biological parameters mentioned above. The range of values to be considered as a risk for each parameter is shown in Table 1.

Quality of Life

This was measured against the EuroQol-visual analog scale (EQ-5D-3L), on which the general perception of state of health is registered on a 20-cm vertical scale, graded from 0 (indicating the words state of health imaginable) to 100 (indicating the best state of health possible).

Degree of PA (METs)

This was measured by the patients filling in a table on which were indicated the activities undertaken the week preceding the initial interview to measure the pre-intervention activity and those carried out the final week of the intervention to measure the post-intervention data, excluding of the weekly session of the program. Afterwards, the activities indicated by the patients were categorized by their respective values of metabolic equivalents (METs), in accordance with the values provided in the compendium of PA [25]. Finally, the METs value for each activity was multiplied by the number of minutes it was carried out throughout the week to obtain the weekly METs carried out by each patient.

Functional Fitness

- *Balance test (BT):* consists of keeping one foot elevated with the hands on the hips. Every participant had two practice attempts and one judged attempt to achieve it with the stronger foot. The result was the number of seconds without touching the floor with the foot that was elevated or removing the hands from the hips; with 45 s being the maximum achievable.
- *Chair stand test (CS):* measures the strength of inferior extremities. Each participant had two practice attempts and one judged attempt. The result was the number of times that the patient got up and sat down in the chair correctly over 30 s.
- *Bicep curls (BC):* measures upper-body strength. Each participant had two practice attempts and one judged attempt. The result was the number of times that the weight (2 kg for women and 3 kg for men) was lifted correctly over 30 s.
- *Chair sit-and-reach test (CSR):* measures the flexibility of the torso. Each participant had two practice attempts and two judged attempts. The subject sits on the edge of a chair (placed against a wall for safety). One foot must remain flat on the floor. The other leg is extended forward with the knee straight, heel on the floor, and ankle bent at 90°. Place one hand on top of the other with tips of the middle fingers even. Instruct the subject to inhale, and then as they exhale, reach forward toward the toes by bending at the hip. Keep the back straight and head up. Avoid bouncing or quick movements, and never stretch to the point of pain. Keep the knee straight, and hold the reach for 2 s. The distance is measured between the tip of the fingertips and the toes. If the fingertips touch the toes then the score is zero. If they do not touch, measure the distance between the fingers and the toes (a negative score), and if they overlap, measure by how much (a positive score). The result was the distance reached between the two middle fingers of the hand and the tip of the toes, with the distance to reach the tip of the toes considered to be in the negative and the distance beyond this point in the positive.
- *Agility (AG):* measures the agility of movements. Each participant had two practice attempts and two judged attempts. Agility is the ability to move quickly and change directions while maintaining control and balance. The result was the lowest time recorded for carrying out the task.
- *Six-minute walk (6-MW):* measures the aerobic capacity. Each subject completed one judged attempt. Points were awarded for total distance covered in 6 min along a 45.72 m rectangular course, with markers every 4.57 m.

Degree of Satisfaction Measured through a questionnaire with numbers ranging from one to five (one = do not agree at all; five = completely agree) for the following aspects:

- *Satisfaction with the instructor (SI):* comprised three items to be evaluated by the patients regarding their degree of satisfaction for the person giving the practical sessions.
- *Satisfaction with the program (SP):* comprised four items to be evaluated based on the satisfaction and perceived merit by the patients regarding carrying out the course in different environments.
- *Satisfaction with the organization (SO):* comprised three items to evaluate the patients' satisfaction with the timetable, the facilities, and the material used during the practical sessions.

Statistical Analysis

The quantitative variables are presented as average and standard deviation and the qualitative variables as frequencies and percentages. For the analysis of these, SPSS software was used (version 26). Due to the small sample size and to the variety within the group being high, non-parametric tests were carried out for the analysis of the data.

Therefore, the Wilcoxon test for paired samples was used with the aim of determining whether there were improvements among the data pre- and post-intervention in relation to the physical and biological variables, the degree of PA, quality of life, and functional fitness. The level of significance was set at 0.05 ($p \leq 0.05$). The size of the effect was calculated through the standardized mean difference (SMD) (the mean of the changes divided by the difference of the means); an effect size of 0.2–0.49 was considered small, 0.5–0.79 moderate, and 0.8 or greater as high.

For the analysis of the participants' degree of satisfaction with the intervention, a study of frequencies was carried out, and the average (SD) was calculated for each of the variables in question.

Results

The Mugiment Txorierri program had a high index of attendance (an average of 82.17%). The average age (SD) of the patients was 66.2 ± 8.0. The group comprised a total of 67 participants, of which a final total of 19 men and 27 women ($n = 46$) were included in the study as they met the minimum attendance requirement.

The changes that occurred in the different variables analyzed appear in Table 3. Using the Wilcoxon test for paired samples showed significant changes in the undertaking of all the functional fitness tests: BMI ($p = 0.006$), SAP ($p = 0.03$), DAP ($p = 0.01$), METs ($p <= 0.001$), EuroQoL-VAS ($p <= 0.001$), as well as in the total number of risk factors (RFT) ($p = 0.03$).

Despite glucose, LDL, HDL and triglycerides not improving to statistically significant degree, a decrease was observed in the case of the values of glucose and triglycerides (10.61 and 9.88 mg/dL, respectively).

The effect sizes found were for the following variables: RFT (SMD = 1.31); METs (SMD = 1.49); AG (SMD = 1.13); CS (SMD = 1.12); CSR (SMD = 0.84); AC (SMD = 1.51; and 6-MW (SMD = 1.45). On the other hand, a moderate effect was observed in the following variables: BMI (SMD = 0.5) and EuroQoL-VAS (SMD = 0.59).

In terms of the participants' satisfaction, the average (SD) of the variables asked was the following: SI 4.9 (0.29); SP 4.78 (0.38); SO 4.43 (0.55) (Table 4).

In Figs. 1 and 2, the relative changes that occurred in those variables that improved significantly can be observed.

Discussion

The results obtained in this study show that for patients at risk of cardiovascular disease, carrying out a regulated program

Table 3 Values of the different variables measured on the study at the start of the program and afterwards ($n = 46$)*

	Pre-test	Post-test	*p* value	Effect size (SMD)
Physical parameters				
BMI	31.2 (4.5)	30.5 (4.8)	0.006	0.50
SAP	133.7 (14.2)	130.1 (12.5)	0.03	0.32
DAP	78.6 (8.4)	75.8 (8.4)	0.01	0.38
Biological parameters				
GLU	117.3 (46.3)	106.7 (26.5)	0.11	0.25
CHO	192.2 (3.8)	190.1 (39.3)	0.94	0.01
LDL	109.3 (35.5)	107.0 (40.2)	0.76	0.04
HDL	54.2 (16.4)	54.8 (15.8)	0.39	0.13
TRI	142.6 (53.7)	133.7 (54.4)	0.24	0.18
Functional fitness				
Balance	26.0 (15.5)	29.4 (14.5)	0.02	0.37
Chair stand	13.6 (3.4)	17.5 (4.8)	0.00	1.12
Bicep curl	17.9 (5.7)	22.4 (5.1)	0.00	1.51
Chair sit-and-reach	− 3.2 (7.4)	2.7 (9.2)	0.00	0.84
Agility	5.8 (1.4)	4.7 (0.6)	0.00	1.13
6-MW	495.6 (79.8)	552.9 (72.1)	0.00	1.45
Degree of physical activity				
METs	1465.1 (954.1)	3087 (1468.0)	0.00	1.49
Quality of Life				
EuroQoL-VAS	63.2 (13.4)	72.8 (14.2)	0.00	0.59

*Data given as average (SD)

Significant differences with respect to pre-program value

Table 4 Values of the different items in the satisfaction survey (n = 46)*

Variables	Average (SD)
Satisfaction with instructor	4.9 (0.2)
Respect for the patients	4.9 (0.2)
Useful examples	4.9 (0.2)
Possesses adequate knowledge	4.8 (0.6)
Satisfaction with program	4.7 (0.3)
Course increases interest in PA	4.8 (0.4)
Increase in knowledge regarding PA	4.7 (0.5)
The information learned helps do PA independently	4.7 (0.6)
Course has made patient practice healthier habits	4.6 (0.6)
Happiness with class attendance	4.8 (0.4)
Satisfaction with organization	4.4 (0.5)
Timetable	4.7 (0.5)
Material and facilities	3.7 (1.3)
Achievement of initial expectations	4.7 (0.4)

* Data given as average (SD)

Each item was valued between 1 and 5 (1, strongly disagree; 2, disagree; 3, not sure; 4, agree; 5, strongly agree)

promoting PA for health brings about improvements in risk factors associated with CVD. Within these risk factors, significant improvements were observed in BMI, SAP, and DAP (Fig. 1).

These results in the improvement of SAP and DAP are in consonance with two meta-analyses [26, 27] which concluded that with aerobic exercise, a decrease in arterial pressure of 5–7 mmHg can be achieved, and with strength exercises, a decrease of 2–3 mmHg in adults with hypertension [28, 29].

In addition, there are studies that have shown an improvement in bodily composition in different models of intervention [30], finding an inverse relationship between PA and BMI [31]. This study confirms that the promotion of health through physical exercise can reduce the values of BMI.

Furthermore, despite not being statistically significant, a tendency of a decrease of blood glucose and the level of triglycerides was observed. These findings are in accordance with the results obtained in different meta-analyses [32, 33]. In the first study, the effects of different exercise programs on cardiovascular risk factors related to metabolic syndrome were analyzed; in the second, however, only the effects of different types of exercise programs on the lipid profile were analyzed. However, in these two studies significant improvements in the levels of HDL and decreases in the levels of LDL cholesterol were observed, which, in our study, it has not been possible to verify, probably due to not having more weekly sessions and not controlling the diet of the participants, which has been observed as a factor of notable importance to combine with exercise to obtain more substantial improvements to the lipid profile [34].

It has been observed that the degree of PA carried out routinely by patients and measured in METs, increased 110.69%, which demonstrates a substantial increase in activity carried out by the patients who reflected that what they had learned in the classes was greatly useful to them to undertake PA on their own.

In addition to what has previously been cited, in this study, it was also shown that undertaking the program produced improvements in the performance of all the functional fitness tests carried out. The loss of functional fitness has been associated with the decrease in ability to produce strength [9, 35]. Therefore, maintaining muscular strength is crucial to maintaining the ability to carry out day-to-day activities [36]. In this study, improvements in the strength of the lower limb (CS) of 28.18% and of 25.16% in the upper limb (AC) were observed.

Balance and agility are other regularly studied components of functional fitness, due to their direct relationship with carrying out day-to-day activities [37]. Both the static balance test (SB) and the agility test (AG) showed improvements of 12.78% and 18.78% respectively.

The aging process, together with the prevalence of a sedentary attitude, is associated with significant losses in the range of joint mobility, an important factor

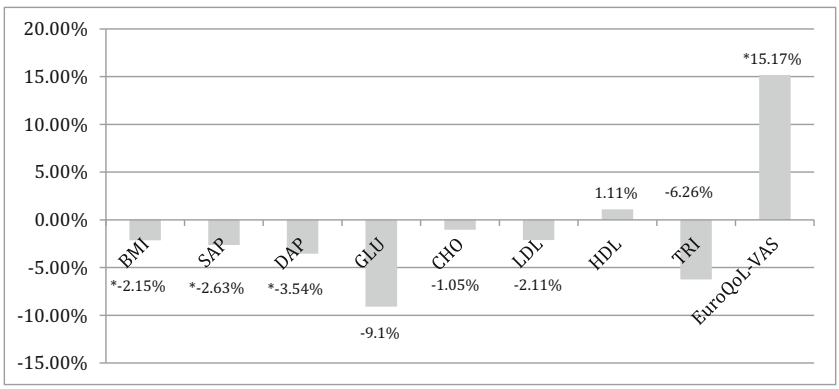

Fig. 1 Differences in the performance of the functional fitness tests between pre- and post-intervention values. *Significant differences ($p < 0.05$). BMI, body mass index (kg/cm^2); SAP, systolic arterial pressure (mmHg); DAP, diastolic arterial pressure (mmHg); GLU, glucose (mg/dL); CHO, cholesterol (mg/dL); LDL, cholesterol LDL (mg/dL); HDL, cholesterol HDL (mg/dL); TRI, triglycerides (mg/dL); EuroQoL-VAS

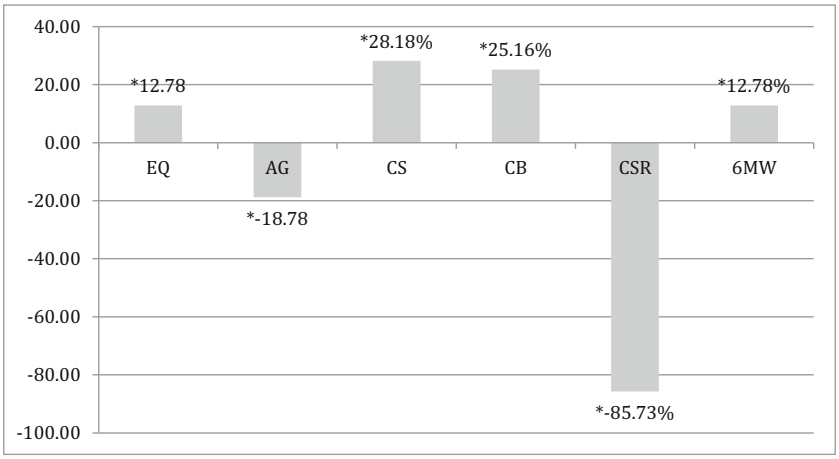

Fig. 2 Differences in the performance of the functional Fitness tests between pre- and post-intervention values. *Significant differences ($p < 0.05$). EQ, balance (seconds); CS, chair stand (rep); CB, bicep curl (rep); CSR, chair sit-and-reach (cm); AG, agility (seconds); 6-MW, 6-min walk (m)

associated with the loss of functional fitness and, consequently, with the deterioration in the ability to carry out day-to-day activities [38]. The torso flex test (CSR) was the one in which the greatest improvements were observed, at 85.73%.

An improvement of 11.57% was also observed in the carrying out of the six-minute walk test, which is associated with cardiorespiratory capacity. This fitness aspect is also considered as a determining factor in functional limitations [39, 40]. Maintaining satisfactory levels of cardiorespiratory capacity could extend life expectancy, improve the natural process of functional decline [39–41], and reduce mortality in all causes [4].

Finally, it is also worth pointing out that the patients' perceived quality of life measured against the EuroQoL-VAS graph scale improved by 15.17%. This result coincides with the those by Eriksson et al. [42] who found significant improvements ($p = 0.02$) in the results in the EuroQoL-VAS in participants on a program of PA, while those who formed part of a group that did not carry out PA worsened significantly in this aspect. Furthermore, in that study, a program was carried out over 3 years, and improvements in quality of life were found to relate to the cost for primary care health services. Savings of $47 per patient were observed in the group that carried out PA in comparison with the control groups [42].

Therefore, the data confirm that carrying out a regulated program of PA is effective for reducing the total number of associated cardiovascular risk factors; improving all parameters of functional fitness studied as well as physical parameters such as BMI, SAP, and DAP increasing the degree of PA carried out; and increasing the subjective perception of the health of the patients. Furthermore, we find that carrying out these types of programs is awarded a high degree of satisfaction by the participants.

Conclusions

In an aging society, like ours, the role of elderly people must become more and more relevant; if, as is intended, they are to participate wholly in the organization and development of said society. Living longer and living healthy are a permanent double challenge of our time, which depends significantly on incorporating or improving, depending on each case, some equally healthy habits. Among them is, without question, undertaking PA in accordance with the needs and possibilities of every individual.

There is sufficient evidence obtained for the positive effect of PA on health and for cost-effectiveness to implement programs for promoting it.

Additionally, the characteristics of proximity and immediacy which the municipal environment offers faced with other levels of public management, make it a nucleus of a performance with enormous potential in terms of its effectiveness. On the program referred to herein, it could be seen that it is possible to tie together satisfactorily the medical environment and the community. Moreover, it was verified that these types of programs, aside from being healthy, are welcomed warmly by the people in the community. On the other hand, the creation of homogenous groups of patients has positive effects on their adhesion to PA.

Therefore, efforts to improve public health should advocate for getting more people to be more active and for longer, instead of hoping for everyone to possess an arbitrary level of fitness or a specific level of activity.

Limitations and Potential

On one hand, the program duration was a relatively brief period of time due to the limitation of dates for participation, which may be the reason why more significant changes in the biological parameters were not observed. Nevertheless,

only a 4-week period was available for acquiring patients, a period that, if greater, would probably have yielded an increase in the number of participants on the program.

It is also worth pointing out that the walking test was not carried out according to standards [43].

On the other hand, the collaboration of the primary care health centers made it possible to recruit a more-than-acceptable number of participants despite the time handicap. Moreover, the fact this program was carried out within an affiliated community environment made it possible for participants who were unable to attend sessions in their municipality do so in another, improving their attendance.

Acknowledgments This research project has been done, thanks to the support of the Basque Government Sport Service together with the collaboration of the Health Council. Furthermore, it is worth highlighting the collaboration of the members of the medical body of the Uribe-Kosta province and those of the Txorierri Affiliation, as well as the sport and culture staff of the different municipalities of the area. Thanks also to the doctors Antonio Escobar and Oscar Moracho for the advice on the statistical process.

Declaration of Contribution of Authors All authors contributed to the manuscript in all phases of written from the conception and design to the approval of this version passing through the analysis and interpretation of the data and the critical review for intellectual content.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

Statement of Ethical Approval The study was approved by the University of Deusto Ethics Committee (reference # ETK-32/18-19), and written informed consent was obtained prior to study participation.

References

1. Foreman KJ, Marquez N, Dolgert A, Fukutaki K, Fullman N, McGaughey M, et al. Forecasting life expectancy, years of life lost, and all-cause and cause-specific mortality for 250 causes of death: reference and alternative scenarios for 2016–40 for 195 countries and territories. Lancet. 2018;392(10159):2052–90.
2. World Health Organization. "Informe sobre la situación mundial de las enfermedades no transmisibles." https://apps.who.int/iris/bitstream/handle/10665/149296/WHO_NMH_NVI_15.1_spa.pdf;jsessionid=CDF23F33BDE5F55984E23A6FB82C7B20?sequence=1. Accessed September 25, 2019.
3. Forouzanfar M, Afshin A, Alexander L, et al. Global, regional, and national comparative risk assessment of 79 behavioural, environmental and occupational, and metabolic risks or clusters of risks, 1990–2015: a systematic analysis for the global burden of disease study 2015. Lancet. 2016;388(10053):1659–724.
4. Mandsager K, Harb S, Cremer P, Phelan D, Nissen SE, Jaber W. Association of cardiorespiratory fitness with long-term mortality among adults undergoing exercise treadmill testing. JAMA Network Open. 2018;1(6):e183605
5. Organización Panamericana de la Salud. "Plan de acción mundial sobre actividad física 2018–2020. Más personas activas para un mundo sano." Accessed September 25, 2019.
6. Haskell WL, Lee IM, Pate RR, Powell KE, Blair SN, Franklin BA, et al. Physical activity and public health: updated recommendation for adults from the American College of Sports Medicine and the American Heart Association. Circulation. 2007;116(9):1081–93.
7. World Health Organization. Global recommendations on physical activity for health. https://www.who.int/dietphysicalactivity/global-PA-recs-2010.pdf. Accessed September 25, 2019.
8. Lee IM, Shiroma EJ, Lobelo F, Puska P, Blair SN, Katzmarzyk PT, et al. Effect of physical inactivity on major non-communicable diseases worldwide: an analysis of burden of disease and life expectancy. Lancet. 2012;380(9838):219–29.
9. Thompson W, Gordon N, Pescatello L. Manual ACSM para la valoración y prescripción del ejercicio (3. ed. rev. y ampl. ed.). Paidotribo: Badalona; 2014.
10. Archer E, Blair SN. Physical activity, exercise and non-communicable diseases. Res Exerc Epidemiol. 2012;14(1):1–18.
11. Pedersen BK, Saltin B. Exercise as medicine–evidence for prescribing exercise as therapy in 26 different chronic diseases. Scand J Med Sci Sports. 2015;25:1–72.
12. Piercy KL, Troiano RP, Ballard RM, Carlson SA, Fulton JE, Galuska DA, et al. The physical activity guidelines for Americans. JAMA. 2018;320(19):2020–8.
13. Izquierdo M, Rodríguez-Mañas L, Casas-Herrero A, Martínez-Velilla N, Cadore EL, Sinclair AJ. Is it ethical not to prescribe physical activity for the elderly frail? J Am Med Dir Assoc. 2016;17(9):779–81.
14. The World Bank. "Life expectancy at birth, total (years)." https://data.worldbank.org/indicator/SP.DYN.LE00.IN. Accessed September 25, 2019.
15. Pedersen BK, Akerstrom TC, Nielsen AR, Fischer CP. Role of myokines in exercise and metabolism. J Appl Physiol. 2007;103(3):1093–8.
16. Fiuza-Luces C, Garatachea N, Berger NA, Lucia A. Exercise is the real polypill. Physiology. 2013;28(5):330–58.
17. Bull F, Gauvin L, Bauman A, Shilton T, Kohl H, Salmon A. The Toronto charter for physical activity: a global call for action. J Phys Act Health. 2010;7(4):421–2.
18. Gobierno Vasco-Eusko Jaurlaritza. "Mugiment Basque Country: Proyecto para crear una sociedad más activa (2013–2020)". https://www.euskadi.eus/salud-deporte/web01-a2kirola/es/. Accessed September 20, 2019.
19. Gobierno Vasco-Eusko Jaurlaritza. "Políticas de Salud para Euskadi 2013–2020". https://www.osakidetza.euskadi.eus/contenidos/informacion/publicaciones_informes_estudio/es_pub/adjuntos/plan_salud_2013_2020.pdf. Accessed September 20, 2019.
20. Staten LK, Scheu LL, Bronson D, Peña V, Elenes JJ. Pasos Adelante: the effectiveness of a community-based chronic disease prevention program. Preventing chronic disease. 2005;2(1):A18.
21. Simkin-Silverman LR, Wing RR, Boraz MA, Kuller LH. Lifestyle intervention can prevent weight gain during menopause: results from a 5-year randomized clinical trial. Ann Behav Med. 2003;26(3):212–20.
22. World Health Organization. "Interventions on diet and physical activity: what works: summary report." https://www.who.int/dietphysicalactivity/summary-report-09.pdf. Accessed September 25, 2019.
23. Kubota A, Carver A, Sugiyama T. Associations of local social engagement and environmental attributes with walking and sitting among Japanese older adults. Journal of Aging and Physical Activity. 2019;1(aop):1–7. https://doi.org/10.1123/japa.2018-0321.

24. Lee C. Attitudes, knowledge, and stages of change: A survey of exercise patterns in older Australian women. Health Psychol. 1993;12(6):476–80.
25. Ainsworth BE, Haskell WL, Whitt MC, et al. Compendium of physical activities: an update of activity codes and MET intensities. Medicine and Science in Sports and Exercise. 2000;32(9; SUPP/1): S498–S504.
26. Johnson BT, MacDonald HV, Bruneau ML Jr, et al. Methodological quality of meta-analyses on the blood pressure response to exercise: a review. J Hypertens. 2014;32(4):706–23.
27. Pescatello LS, MacDonald HV, Lamberti L, Johnson BT. Exercise for hypertension: a prescription update integrating existing recommendations with emerging research. Curr Hypertens Rep. 2015;17(11):87.
28. Cornelissen VA, Smart NA. Exercise training for blood pressure: a systematic review and meta-analysis. Journal of the American Heart Association. 2013;2(1):e004473.
29. Pescatello LS, Franklin BA, Fagard R, Farquhar WB, Kelley GA, Ray CA. Exercise and hypertension. Med Sci Sports Exerc. 2004;36(3):533–53.
30. Prieto JA, Valle MD, Nistal P, Méndez D, Abelairas-Gómez C, Barcala-Furelos R. Repercusión del ejercicio físico en la composición corporal y la capacidad aeróbica de adultos mayores con obesidad mediante tres modelos de intervención. Nutr Hosp. 2015;31(3):1217–24.
31. Lakka TA, Laaksonen DE, Lakka HM, et al. Sedentary lifestyle, poor cardiorespiratory fitness, and the metabolic syndrome. Med Sci Sports Exerc. 2003;35:1279–86.
32. Mann S, Beedie C, Jimenez A. Differential effects of aerobic exercise, resistance training and combined exercise modalities on cholesterol and the lipid profile: review, synthesis and recommendations. Sports Med. 2014;44(2):211–21.
33. Pattyn N, Cornelissen VA, Eshghi SRT, Vanhees L. The effect of exercise on the cardiovascular risk factors constituting the metabolic syndrome. Sports Med. 2013;43(2):121–33.
34. Kelley GA, Kelley KS, Roberts S, Haskell W. Combined effects of aerobic exercise and diet on lipids and lipoproteins in overweight and obese adults: a meta-analysis. J Obes. 2012;2012:1–16.
35. Brill PA, Macera CA, Davis DR, Blair SN, Gordon NEIL. Muscular strength and physical function. Med Sci Sports Exerc. 2000;32(2):412–6.
36. Buchman AS, Wilson RS, Boyle PA, Tang Y, Fleischman DA, Bennett DA. Physical activity and leg strength predict decline in mobility performance in older persons. J Am Geriatr Soc. 2007;55(10):1618–23.
37. Koenig JM, Jahn DM, Dohmeier TE, Cleland JW. The effect of bench step aerobics on muscular strength, power, and endurance. The Journal of Strength & Conditioning Research. 1995;9(1):43–6.
38. Kuhlman KA. Cervical range of motion in the elderly. Arch Phys Med Rehabil. 1993;74(10):1071–9.
39. Glaser RM. An evolution of exercise physiology: effects of exercise on functional independence with aging and physical disabilities. Journal of Rehabilitation Research and Development. 1997;34(3): VI.
40. Morey MC, Pieper CF, Cornoni-Huntley J. Physical fitness and functional limitations in community-dwelling older adults. Med Sci Sports Exerc. 1998;30(5):715–23.
41. Wang BW, Ramey DR, Schettler JD, Hubert HB, Fries JF. Postponed development of disability in elderly runners: a 13-year longitudinal study. Arch Intern Med. 2002;162(20):2285–94.
42. Eriksson MK, Hagberg L, Lindholm L, Malmgren-Olsson EB, Österlind J, Eliasson M. Quality of life and cost-effectiveness of a 3-year trial of lifestyle intervention in primary health care. Arch Intern Med. 2010;170(16):1470–9.
43. Gochicoa-Rangel L, Mora-Romero U, Guerrero-Zúñiga S, et al. Prueba de caminata de 6 minutos: recomendaciones y procedimientos. Neumología y Cirugía de Tórax. 2015;74(2): 127–36.