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Effectiveness of Aerobic Exercise on Physiological Parameters Among Clients With Stage-I Hypertension at Narambai, Puducherry

Maheswari. S[1,*], G. Muthamilselvi[2], R. Gomathy[3]
[1]Lecturer, Department of Medical Surgical Nursing, Vinayaka Missions college of Nursing, Puducherry.
[2]Principal, Vinayaka Missions college of Nursing, Puducherry, Vinayaka Missions Research Foundation, Salem
[3]Associate Professor in Department of Medical Surgical Nursing, Vinayaka Missions college of Nursing, Puducherry.
*Email ID : maheswari.s@vmcnpdy.edu.in

ABSTRACT
Hypertension is not a disease but it is an important risk factor for cardiovascular complications. It can be defined as a condition where blood pressure is elevated to an extent where clinical benefit is obtained from blood pressure lowering. A quasi experimental research design was adopted and study subject were divided into Study group (SG, n= 30) and Control group (CG, n= 30). A written informed Consent was obtained from the study participants with assurance of confidentiality. Data were collected such as demographic variables, health profile, physiological parameters (Height, weight, Body mass index (BMI), Pulse rate (PR), Respiratory rate (RR), Blood pressure (BP). The data was collected for the period of four weeks. Samples in the study group were taught and insisted to perform aerobic exercises (brisk walking) and instructed to do it for 4 weeks whereas the control group received the routine care. The posttest was conducted at the end of the 4th week using the same instrument for both the groups (SG & CG. Data were analyzed by using descriptive and inferential statistics. The study results revealed that the comparison of pre and posttest mean score of BMI, PR, RR, SBP and DBP in the SG and CG. The pretest mean score in the SG was 27.50, 78.20, 24.87, 147.40 and, 92.73, whereas in the CG it was 25.84, 79.0, 25.53, 147.13 and 9.0 respectively. The posttest mean score in the SG was reduced to 27.50, 77.73, 24.80, 133.00 and 84.0, when comparing with the CG it was increased to 25.84, 80.33, 22.67, 142.50 and 92.67 respectively. The obtained 't' value of PR in the SG and CG was 0.286 and –0.617,'t' value of RR was 0.073 and 2.625, 't' value of SBP was 14.102 and 3.818 and the 't' value of DBP in the SG was 5.316, whereas in the CG was -0.790. Therefore, the study concluded that the aerobic exercise performed by the stage I hypertensive clients was showing highly effective in normalizing the physiological parameters.
***Keywords**: Clients with stage I hypertension, Physiological parameters, Aerobic exercises.*

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INTRODUCTION

In worldwide, 23.10% men and 22.60% women above 25 years suffer from hypertension. They estimated that 57 million global deaths in 2008. Recent report indicates that nearly 1 billion adults more than a quarter of the whole population had hypertension in 2000 and this is predicted to increase to 1.56 billion by 2025. The lowest prevalence of hypertension reported in rural India were 3.4% in men and 6.8% in women, and the highest prevalence in Poland were 68.9% in men and 72.5% in women [1].In India, the overall prevalence of hypertension by 2021 will be 159.46/1000 population. Hypertension will be the major cause of death and disability by the end of 2021. The prevalence of hypertension is increasing in both rural and urban communities. Hypertension is responsible for 57% of stroke deaths and 24% of coronary heart disease deaths in India [2].In Tamil Nadu, about 75 per cent of people with hypertension were ignorant of their condition and ignorance was more in the younger age group. People were classified as Type I, Type II or Type III based on the World Health Organization (WHO) criteria. About 71 percent of people had Type I and 20.3 percent had Type II. Nearly 29 percent of the population had only systolic BP above normal and 31 percent had diastolic BP above normal [3]. In Puducherry, a cross sectional study was conducted to assess the prevalence of CVD risk parameters and to estimate the cardiovascular risk among adults aged >40 years, using WHO/ISH risk prediction chart. Categorizing people as low (<10%)/ moderate (10% - 20%)/ high (>20%) risk is one of the crucial steps to mitigate the magnitude of

cardiovascular fatal / non-fatal outcome. The result revealed that there is significant burden of CVD risk in the rural Pondicherry as assessed by WHO/ISH risk prediction chart [4].

STATEMENT OF THE PROBLEM

A study to assess the effectiveness of aerobic exercise on Physiological parameters among clients with stage I hypertension at Narambai, Puducherry.

OBJECTIVES OF THE STUDY

- ✓ To determine the health profile of the clients with stage I hypertension
- ✓ To assess the pre - interventional level of physiological parameters among clients with stage I hypertension.
- ✓ To assess the effectiveness of aerobic exercise on physiological parameters among clients with stage I hypertension.
- ✓ To find out the association between the pre – interventional level of physiological parameters and selected demographic variables and health profile.

MATERIAL AND METHODS

A quasi experimental research design was adopted and study subject were divided into Study group (SG, n= 30) and Control group (CG, n= 30). Prior to data collection, a formal written permission was obtained from the concerned authorities of the Narambai area, Puducherry. A written informed Consent was obtained from the study participants with assurance of confidentiality. Data were collected such as demographic variables, health profile, physiological parameters (Height, weight, Body mass index (BMI), Pulse rate (PR), Respiratory rate (RR), Blood pressure (BP).The data was collected for the period of four weeks. Samples in the study group were taught and insisted to perform aerobic exercises (brisk walking) and instructed to do it for 4 weeks whereas the control group received the routine care [2]. The posttest was conducted at the end of the 4th week using the same instrument for both the groups (SG & CG. Data were analyzed by using descriptive and inferential statistics. The tool was validated by seven experts and the reliability of the tool was assessed by using inter - rater reliability method and found to be highly reliable. Pilot study was conducted among six clients with stage I hypertension at Pannithittu village, Puducherry [3].

RESULTS

1. Findings related to demographic variables

- With regard to age, the highest number of clients with stage I HTN 11 (36.67%) were in the age group of 51 – 60 years in the CG, whereas in the SG, maximum 10 (33.33%) were in the age group of 41 – 50 years
- Majority of clients with stage I HTN were male 18 (60%) in the CG, whereas in the SG 17 (56.67%) were male.
- Regarding the religion, most of the clients with stage I hypertension 20 (66.67%) in the CG, whereas in the SG 16 (53.33%) were Hindus and with residence all 30 (100%) were residing in rural area in both the groups.
- Regarding the marital status, most of the clients with stage I hypertension 21 (70.00%) in the CG, whereas in the SG 17 (56.67%) were married with educational status most of the clients with stage I HTN 10 (33.3%) had primary school education in the CG, 7 (26.67%) had no formal education in the SG.
- 11 (36.67%) were working in private sector in the CG, whereas in the SG, 20 (66.67%) were working in Central/State/Public sector.
- Considering the family income, in the CG 13 (43.33%) were earning below Rs. 5000 per month, whereas in the SG, 8 (26.67%) were earning Rs. 5001 – 10000 and Rs. 15001 and above respectively
- Regarding family type and number of children, most of the client with stage I HTN in both the groups were belongs to joint family 18 (60%) in the CG, 15 (43.33%) in the SG and 10 (33.33%) in the CG whereas in the SG 13 (43.33%) had 3 to 4 children respectively.
- In regard to food type, majority of the stage I HTN clients in both the groups were non vegetarian 15 (50%) in the CG and 18 (60%) in the SG
- Regarding the source of getting health information, maximum stage I hypertensive clients received health information through media in both the groups, in the CG 13 (43.33%) and in the SG 10 (33.33%).

Findings related to health profile

- Regarding the diagnosis of hypertension, the majority of clients with stage I HTN in the CG, 15 (50%) had come to know about their HTN during screening programme, 17(56.67%) were recently diagnosed first to have HTN, 14(46.67%) were first diagnosed to have HTN in a primary health center, 17(56.67%) had blood relatives with history of HTN, 14(46.67%) used to go to primary health center for routine follow up to check their BP, 17(56.67%) used to go for routine BP check when advised by the doctor and 18(60%) had not paid anything for consultation and / or drugs for the treatment of their HTN whereas in the SG, 17(56.67%) had come to know about their HTN during routine medical checkup, 15(50%) were diagnosed first to have HTN <5 years, 14(46.67%) were first diagnosed to have HTN in a private nursing homes/ clinic, 18(60%) had blood relatives with history of HTN, 14(46.67%) used to go to private nursing homes/ clinic for routine follow up to check their BP, 21(70%) used to go for routine BP check when advised by the doctor and 17(56.67%) had not paid anything for consultation and / or drugs for the treatment of their HTN.
- Considering the behavioural measurements, most of the clients with stage I hypertension in the CG, 18(60%) were currently smoking tobacco products, out of 18 samples, 14(77.78%) smoked manufactured cigarettes, 9(50%) smoked 4 – 6 cigarettes/day, 10(55.56%) were smoking for 1– 5 years, 10(55.56%) had not tried to stop smoking during the past 12 months, 13(72.22%) were advised by a doctor or other health worker to quit smoking / tobacco during the past 12 months, 16(53.337%) were not using any smokeless tobacco products, out of 14 samples, 9(64.29%) were using betel leaves,8(57.14%) used once a day, 9(64.29%) had enrolled in a tobacco cessation program and 16(53.33%) had no other person in house who had the habit of smoking whereas in the SG, 15(50%) were currently smoking tobacco products, out of 15 samples, 12(80%) smoked manufactured cigarettes, 9(53.33%) smoked 4 – 6 cigarettes/day, 7(46.67%) were smoking for 6 – 10 years, 8(53.33%) had not tried to stop smoking during the past 12 months, 8(53.33%) were advised by a doctor or other health worker to quit smoking / tobacco during the past 12 months, 17(56.67%) were not using any smokeless tobacco products, out of 13 samples, 9(69.23%) were using betel leaves,10(76.92%) used twice a day, all 13(100%) had not enrolled in a tobacco cessation program and 15(50%) had other person in house who had the habit of smoking.
- With regards to alcohol consumption, maximum stage I hypertensive clients in the CG, 20(66.67%) had never consume any alcohol and out of 10 samples, most of them 3(30%) had consumed alcohol 5 – 6 days per week and 1 -2 days per week respectively, 6(60%) had not tried to stop drinking alcohol during the past 12 months and 8(80%) were advised by a doctor or other health worker to stop drinking alcohol during the past 12 months whereas in the SG, 17(56.67%) had never consumed any alcohol and out of 13 samples, most of them 5(38.46%) had consumed alcohol 1 -2 days per week, 11(73.33%) had tried to stop drinking alcohol during the past 12 months and 9(69.23%) were advised by a doctor or other health worker to stop drinking alcohol during the past 12 months.
- Regarding the diet majority of the clients with stage I hypertension in the CG, 11(36.67%) used to take fruits daily, 23(76.67%) used to have one serving of fruit in a day, 13(43.33%) used to eat vegetables daily, 24(80%) used to have one serving of vegetables in a day, 10(33.33%) used to take non-vegetarian diet daily, 18(60%) were using crystal salt for cooking, 18(60%) think that they were using 3.4 grams of salt, 10(33.33%) rarely add salt to their food right before they eat or while eating, 13(43.33%) were used to take preserved pickle, 13(43.33%) responded as very important to lower the salt in their diet, 20(66.67%) think that too much salt in their diet could cause a health problem and 16(53.33%) were using palmolein oil very often for meal preparation in their household, whereas In the SG, 10(33.33%) used to take fruits daily, 25(83.33%) used to have one serving of fruit in a day, 14(46.67%) used to eat vegetables daily, 25(83.33%) used to have one serving of vegetables in a day, 11(36.67%) used to take non-vegetarian diet daily, 18(60%) were using crystal salt for cooking, 19(63.33%) think that they were using 3.4 grams of salt, 11(36.67%) rarely add salt to their food right before they eat or while eating, 15(50%) were used to take preserved pickle, 14(46.67%) responded as very important to lower the salt in their diet, 22(73.33%) think that too much salt in their diet could cause a health problem and 15(50%) were using palmolein oil very often for meal preparation in their household.
- Considering with the physical exercise of clients with stage I HTN, in the CG, 20(66.67%) were doing physical activity at home, most of them 8(44.44%) had walking as type of physical activity and 7(38.89%) were not doing physical activity for 1-3 times a week whereas in SG, 19(63.33%) were doing physical activity at home and among 19 samples, most of them 7(46.67%) had walking

as type of physical activity and 7(46.67%) were doing physical activity for 1 – 3 times a week and 5 – 7 times a week respectively.

- With regards to hospitalization of clients with stage I HTN, in the CG, most of them 20(66.67%) had not been admitted in the hospital due to raised blood pressure in the last year and 18(60%) had been prescribed medication to lower their blood pressure, whereas in the SG most of them 20(66.67%) had not been admitted in the hospital due to raised blood pressure in the last year and 20(66.67%) had been prescribed medication to lower their blood pressure.
- Regarding the medication and adherence in the CG, most of them 19(63.33%) used to take all their prescribed medicines, all 30(100%) had not taken any herbal or traditional remedy and 9(30%) had chest pain as symptom whereas in the SG, most of them 18(60%) used to take all their prescribed medicines, all 30(100%) had not taken any herbal or traditional remedy and 9(30%) had chest pain as symptom.

Findings related to the assessment of pretest level of Physiological parameters among clients with Stage I HTN

- Assessment of pretest level of BMI, in the CG, 14(46.67%) were normal BMI, 9(30%) were overweight and 7(23.33%) were obese whereas in the SG, 10(33.33%) had normal BMI, 12(40%) were overweight and 8(26.67%) were obese.
- Assessment of the PR, in the CG and SG, all 30(100%) had normal PR in the pretest.
- Assessment of pretest level RR in the CG, 28(93.33%) had normal RR and 2(6.67%) had more than normal RR, whereas in the SG, 28(93.33%) had normal RR and 2(6.67%) had more than normal RR.
- Assessment of pretest level of SBP in the CG, 29(96.67%) had stage I HTN and 1(3.33%) had pre-hypertension whereas in the SG, all 30(100%) had stage I HTN
- Assessment of pretest level of DBP in the CG, 16(53.33%) had stage I HTN, 8(26.67%) had stage II HTN, 4(13.33%) had pre hypertension and 2(6.67%) were normal, whereas in the SG, 16(53.33%) had stage I HTN, 9(30%) had stage II HTN and 5(16.67%) had pre hypertension.

Table 1. Effectiveness of aerobic exercise on the physiological parameters of clients with stage I hypertension in the study group between the pretest and posttest n = 30

Physiological parameters	Pretest		Posttest		Paired 't' Value	P value
	Mean	SD	Mean	SD		
BMI	27.50	5.45	27.50	5.45	-	-
PR	78.20	6.61	77.73	7.25	0.286	0.777 NS
RR	24.87	4.19	24.80	3.69	0.073	0.942 NS
SBP	147.40	4.14	133.00	4.16	**14.102**	**0.0001 ***S**
DBP	92.73	6.79	84.0	8.07	**5.316**	**0.0001***S**

***p<0.001, S – Significant, NS – Non Significant**

The table depicts that in the SG, the pretest mean BMI score was 27.50 ± 5.45 and the posttest mean score was 27.50 ± 5.45. Since there was no change in the BMI 't' cannot be calculated. With regard to PR in the SG, the pretest mean score was 78.20 ± 6.61 and the posttest mean score was 77.73 ± 7.25. The calculated paired 't' value 0.286 was not found to be statistically significant at p value 0.777.With respect to RR in the SG, the pretest mean score was 24.87 ± 4.19 and the posttest mean score was 24.80 ± 3.69. The calculated paired 't' value 0.073 was not found to be statistically significant at p value 0.942.The pretest mean score of SBP was 147.40 ± 4.14 and the posttest mean score was 133.00 ± 4.16. The calculated paired 't'value 14.102 was found to be statistically significant (p<0.001). The pretest mean score of DBP was 92.73 ± 6.79 and the posttest mean score was 84.0 ± 8.07. The calculated paired 't'value 5.316 was found to be statistically significant (p<0.001) [4].

Table 2. Effectiveness of aerobic exercise on physiological parameters of clients with stage I hypertension in the control group between the pretest and posttest n = 30

Physiological parameters	Pretest		Post Test		Paired 't' Value	P value
	Mean	SD	Mean	SD		
BMI	25.84	5.82	25.84	5.82	-	-
PR	79.0	8.32	80.33	6.41	- 0.617	0.542 NS
RR	25.53	3.92	22.67	3.33	**2.625**	**0.014*S**
SBP	147.13	4.80	142.50	4.88	**3.818**	**0.0001 ***S**
DBP	90.0	16.42	92.67	7.03	0.790	0.436NS

***p<0.001, *p<0.05, S – Significant, NS – Non Significant**

The table depicts that in the CG, the pretest mean BMI was 25.84 ± 5.82 and the posttest mean score was 25.84 ± 5.82. Since there was no change in the BMI 't' test cannot be calculated. The pretest mean score of PR was 79.0 ± 8.32 and the posttest mean score was 80.33 ± 6.41. The calculated paired 't' value - 0.617 was not found to be statistically significant [5].(p value 0.542). The pretest mean score of RR was 25.53 ± 3.92 and the posttest mean score was 22.67 ± 3.33. The calculated paired 't' value 2.625 was found to be statistically significant at $p<0.05$ [6]. This clearly indicates that the respiratory rate was not stable..The pretest mean score of SBP was 147.13 ± 4.80 and the posttest mean score was 142.50 ± 4.86. The calculated paired 't' value 3.818 was found to be statistically significant at $p\leq0.001$.The pretest mean score of DBP was 90.0 ± 16.42 and the posttest mean score was 92.67 ± 7.03. The calculated paired 't'value -0.790 was found to be statistically significant at $p<0.001$.

Fig 1. Comparison of level of BMI, PR, RR, SBP and DBP scores among clients with Stage I HTN between the SG and CG in the Posttest

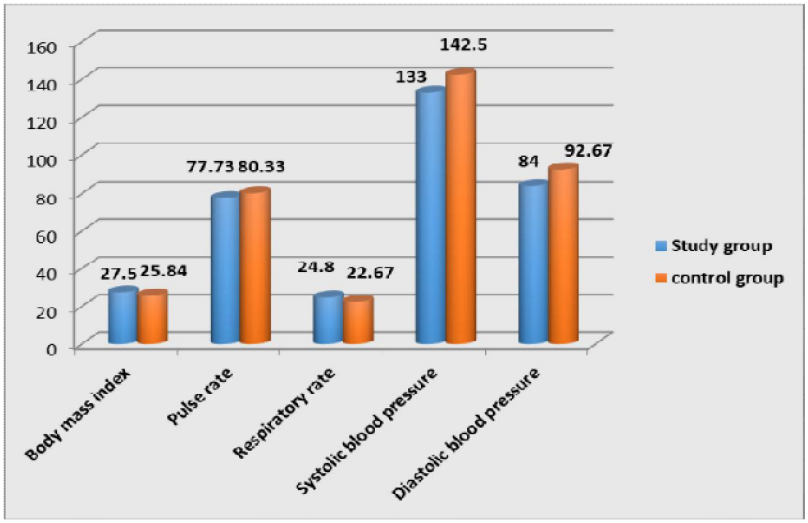

Table 3. Association Between The Pretest Level of Physiological Parameters Among Clients With Stage I HTN With The Selected Demographic Variables In The SG N = 30

Physiological parameters	Demographic Variables			
	Religion	No. of children	Food type	Source of getting health information
BMI	-	$\chi^2 = 12.769$ p = 0.047S*	-	$\chi^2 = 15.419$ p = 0.017S*
PR	-	-	-	-
RR	$\chi^2 = 4.821$ p = 0.028S*	-	-	-
SBP	-	-	$\chi^2 = 6.481$ p = 0.039S*	-
DBP	-	-	-	-

***p<0.05, S – Significant, NS – Non Significant**

The table depicts that the demographic variables number of children and source of health information had shown statistically significant association with pretest level of BMI among clients with stage I HTN at $p<0.05$ level. The demographic variable religion had shown statistically significant association with pretest level of RR among clients with stage I HTN at $p<0.05$ level. In SBP, the demographic variable food type had shown statistically significant association with pretest level among clients with stage I HTN at $p<0.05$ level [7].

Table 4. Association between the pretest level of physiological parameters among clients with stage I hypertension with the selected demographic variables in the CG N = 30

Physiological parameters	Demographic Variables			
	Marital status	**Family type**	**No. of children**	**Source of getting health information**
BMI	-	-	-	-
PR	-	-	-	
RR	$\chi^2 = 6.658$ p = 0.036S*	$\chi^2 = 7.041$ p = 0.030S*	-	-
SBP	-	-	-	-
DBP	-	-	$\chi^2 = 17.854$ p = 0.037S*	$\chi^2 = 20.032$ p = 0.018S*

***p<0.05, S – Significant, NS – Non Significant**

The table depicts that none of the demographic variables had shown statistically significant association with pretest level of BMI among clients with stage I HTN in the CG.In demographic variable marital status and family type had shown statistically significant association with pretest level of RR at p<0.05 level. In demographic variables number of children and source of getting health information had shown statistically significant association with pretest level of DBP at p<0.05 level [8]..

Table 5. Association between the pretest level of physiological parameters among clients with stage I hypertension with the selected health profile in the SG N=30

Health Profile Questionnaires	BMI	PR	RR	SBP	DBP
Do you currently smoke any tobacco products?	-	-	**χ^2=8.250 p = 0.044S***	-	-
Yes					
No					
On average, how many cigarettes do you smoke each day/ week?	-	-	**χ^2=15.368 p = 0.018S***	-	-
1-3 cigarettes / day					
4-6 cigarettes / day					
7-10 cigarettes / day					
More than 10 cigarettes / day					
How much salt do you think you consume?	-	-	-	**χ^2=7.963 p = 0.047S***	-
Too much					
Just the right amount (3.4 grams)					
Too little					
Are you currently doing any physical exercise at home?	**χ^2=12.450 p = 0.002S*****	-	-	-	-
Yes					
No					

*****P<0.001, **p<0.01, *p<0.05, S – Significant, NS – Non Significant**

The table shows that health profile in terms of physical exercises Are you currently doing any physical exercise at home had shown statistically significant association with the pretest level of BMI among clients with stage I hypertension in the SG.In terms of tobacco use do you currently smoke cigarettes and on average, how many cigarettes do you smoke each day/week had shown statistically significant association with pretest level of RR at p<0.05 level in the SG.In terms of diet, how much salt do you think that you consume had shown statistically significant association with pretest level of SBP at p<0.05 level [9].

Table 6. Association between the pretest level of physiological parameters among clients with stage I hypertension with the selected health profile in the CG N=30

Health Profile Questionnaires	BMI	PR	RR	SBP	DBP
When do you go for your routine blood pressure check?	-	-	-	**χ^2=12.94 p = 0.044S***	-
As advised by the doctor					
When I do not feel well					
I do not do any routine check up					
Have you ever consumed any alcohol such as beer, wine, spirits?				**χ^2=6.696 d.f=2 p = 0.035S***	
Yes, If yes, specify the quantity you consume……..					
No					
In a typical week, on how many days do you take fruits?	**χ^2=16.069 d.f=8 p = 0.013S***	-	-		-
Daily					
1-2 days per week					
2-3 days per week					
3-4 days per week					
5-6 days per week					
Never					

*****P<0.001, **p<0.01, *p<0.05, S – Significant, NS – Non Significant**

The table shows that health profile in terms of diet, in a typical week, on how many days do you take fruits had shown statistically significant association with the pretest level of BMI among clients with stage I hypertension in the CG.In terms of diagnosis of hypertension, When do you go for your routine blood pressure check and in terms of alcohol consumption, Have you ever consumed any alcohol such as beer, wines spirits had shown statistically significant association with pretest level of SBP at p<0.05 level in the CG [10].The study recommends the following for further research:

- Similar study can be replicated on a large samples there by findings can be generalized for large population
- The study to assess the effect of structured teaching programme regarding non pharmacological management of hypertension like diet, relaxation techniques and exercises can be done
- Comparative study can be done to evaluate the blood pressure using the other non pharmacological measures among the clients with hypertension in urban and rural populations
- Comparative study can be done with and without the pharmacological treatment among clients with Hypertension
- A study can be performed by developing a self instructional module which enables the care givers to become aware of effectiveness of complementary and alternative therapies like exercise, relaxation therapy and diet and its benefits

CONCLUSION

The prevalence of hypertension is high and it majorly affects the quality of life. Timely diagnosis using clinical criteria and effective intervention is of utmost importance. Alternative treatment is one of the best methods to treat hypertension as well to overcome the effects OTC of medications. The data revealed that aerobic exercise had positive impact and found to be effective in reducing the blood pressure and normalizing the physiological parameters in the study group. The study concluded that the aerobic exercise was effective in reducing the blood pressure and normalizing the physiological parameters.

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