

# Effect of Cork Fish Supplements on Improvement of CD4 and Albumin in People Living With HIV/AIDS in Papua

**Arwam Hermanus MZ<sup>a</sup>, Novi Warrouw<sup>b</sup>, Ester Rumaseb<sup>c</sup>, Jems KR Maay<sup>d\*</sup>, <sup>a,b,c,d</sup>Health Environment School, Nursing Program, Health Polytechnic of Jayapura, Jalan Padang Bulan 2, Hedam, Districk Heram, Jayapura City, Papua, Indonesia, E-Mail : <sup>d\*</sup>[jemskrmaay@yahoo.co.id](mailto:jemskrmaay@yahoo.co.id)**

The Papua Provincial AIDS Commission (KPA) reports that as of 31st March 2016 the number of HIV sufferers in Papua Province was 25,233 cases of which 98% were approved by sex. The highest number of HIV / AIDS sufferers in Jayawijaya Regency was 5,293 cases and Mimika City had 4,524 cases. Based on age group, the highest number of HIV / AIDS sufferers in the 25-49 year age range was 5,333 cases and 9,211 AIDS cases (KPA, 2016). Data from the Health Service in 2018 shows the number of HIV-AIDS sufferers in Papua donating 39,978 people. Arwam's research results (2011) show how HIV-AIDS does not play a role using the "H" mode, so that in 2040 the prevalence of HIV-AIDS will increase to 19.6% (Arwam, 2011). The aim of this study is to examine the effect of cork fish capsule supplements on improving nutritional status, albumin levels, and CD4 counts in people living with HIV in Papua Province. The method is true experimental research with a non-randomized control group pre- and post-test design. The population were all People Living With HIV / AIDS (PLWHA) who came to visit the VCT clinic to receive antiretroviral (ARV) therapy. The measurement results of the weight of the study subjects show that the weight in the cork fish capsule treatment group before the intervention was 53 kg / bb and after the intervention for 30 days had increased to 58 kg / bb, which increased by 5 kg / bb. This showed a significant increase with a value of  $p = 0.025 < 0.05$ . While in the placebo control group before BB intervention was 50 kg and after 30 days of intervention decreased by 49 kg with the difference being by -1.2 kg / bb, with a value of  $p = 0.109, p > 0.05$ . This study shows that the mean albumin levels of patients before the intervention was 2.5 mg / dl and after the intervention amounted to 3.2 mg / dl

compared to the control group which experienced a slight increase from 3.68 mg / dl to 3.72 mg / dl, of only 0.04 mg / dl. This study shows that the average CD4 count of patients before the intervention was 222 mg / dl and after the intervention was 234 mg / dl, an increase of 12 mg / dl. This is compared to the control group which decreased from 475 mg / dl to 472 mg / dl, with a difference -3.2 mg / dl. The paired sample test results showed that there were significant differences in CD4 cell counts between before and after the intervention, in the cork fish meal preparation group ( $p = 0.025 < 0.05$ ), but differed in the control group ( $p = 0.306 > 0.05$ ). Based on the results of the study it can be concluded that PLWHA supplemented with cork fish capsules can improve the nutritional status of patients proven to increase body weight and after giving cork fish capsules for 1 month showed an increase compared to only being given antiretroviral therapy (ARV). PLWHA supplemented with cork fish capsules may experience an increase in albumin after one month of intervention rather than only taking ARV drugs. PLWHA supplemented with cork fish capsules can experience an increase in CD4 cell count, after being intervened for one month instead of only taking antiretroviral drugs (ARVs).

**Key words:** *cork fish, CD4 and Albumin, PLWHA.*

## Introduction

Acquired Immuno-Deficiency Syndrome is the final stage of a disease caused by HIV accompanied by a decrease in the immune system (Djoerban Z, et al, 2006; Ismail, et al 2018). Indonesia has been categorised as a country with concentrated epidemic levels because there are pockets with a prevalence of more than 5% in certain populations (KPA, 2014), therefore efforts to tackle HIV / AIDS infection are needed based on established policies. Papua Province was ranked first in the cumulative cases of HIV / AIDS in July - September 2014 amounting to 26,235 people consisting of HIV 61.18% and AIDS 38.8% (Ministry of Health Republic of Indonesia, 2014). From the cumulative data on HIV / AIDS cases in Papua, 25.37% died due to psychosocial factors, and the unknown cause is 14.09%. For the cases that fall in the age of reproduction between 15 and 39 years, as many as 63.77% is due to free sex, and the cases including pregnant women is 9.39% (Papua Health Office, 2014).

Data from the AIDS Commission (KPA) in Papua Province reported that up to the 31st March 2016, the number of HIV sufferers in Papua Province was 25,233 cases, of which 98% were caused by sex. The highest number of HIV/AIDS sufferers was in Jayawijaya district

with 5,293 cases and Mimika City had 4,524 cases. Arwam's research results (2011) show that if HIV-AIDS is not treated using the "H" mode approach, by 2040 the prevalence of HIV-AIDS will increase to 19.6% (Arwam, 2011; Kandhro & Pathrannarakul 2013).

The research question is ‘Does cork fish supplement improve nutritional status, albumin and CD4 levels on PLWHA in Papua?’ The purpose of this study is to examine the effect of cork fish capsules supplementation on improving nutritional status, albumin levels, and CD4 counts in people living with HIV/AIDS in Papua Province.

## METHOD OF RESEARCH

This type of research is a true experiment with a non-randomized control group and a pre- and post-test design. The total population is comprised of visitors with HIV/AIDS who come to visit the VCT clinic to receive ARV therapy. The sample is the subjects of the research with the total sampling ‘where all patients suffer from HIV/AIDS amounted to 10 people and all were used as research samples’. The sample is divided into 2 groups, where Group I: get ARV therapy + cork fish capsules supplement and Group II: get ARV + a placebo therapy. There were 10 subjects of the study and they were divided into two groups named P1 and P2, each consisting of 5 people living with HIV in the treatment group (P1) who were given cork fish capsules and 5 people living with HIV (P2) in the control group who were given a placebo. The statistical tests used are: (a) for comparison between groups (two groups), the independent t-test is used if the data are normally distributed, or the Mann Whitney test if the data are not normally distributed; (b) comparisons for measurements between two measurements (pre and post) using the paired t-test for normally distributed data or Wilcoxon test for data that are not normally distributed (Joyvice et al, 2019).

## The Results of the Research and the Discussion

### 1. Characteristics of Research Subjects

**Table 6:** Distribution of Characteristics of Respondents by Treatment Group

Characteristics Respondents	Group				Total	
	Cork Fish Extract Intervention		Placebo Control			
	N	%	n	%	N	%
Age						
a. 23-25 years old	3	60.0	2	40.0	5	50.0
b. 26-28 years old	2	40.0	3	60.0	5	50.0
Ethnic						

a. Papua Wamena	2	40.0	3	60.0	5	50.0
b. Papua Paniai	2	40.0	1	20.0	3	30.0
c. Java	1	20.0	1	20.0	2	20.0
Education						
a. Low	4	80.0	3	60.0	7	70.0
b. High	1	20.0	2	40.0	3	30.0
Marital status						
a. Married	4	80.0	1	20.0	5	50.0
b. Widow	1	20.0	4	80.0	5	50.0

Source: Primary Data, 2018

Observation of characteristics of respondents results showed that were 3 respondents (60.0%) in the intervention group aged 23-25 years while in the control group were 2 respondents (40.0%). Based on ethnicity, respondents from Wamena and Paniai in the intervention group were 2 respondents (40.0%) while in the control group Wamena were 3 respondents (60.0%). Based on the level of education, both the intervention group and the low education control group were more dominant, each with 4 respondents (80.0%) and 3 respondents (60.0%). The marital status of respondents in the treatment showed 4 respondents (80.0%) were married while in the control group 4 respondents (80.0%) were widowed.

## 2. Results of Anthropometry Measurement Research Subjects

### a. Weight .

Before and after 30 days of research on anthropometry physical body weight (kg) research subjects can be shown in the figure below.

**Table 1:** Average weight before and after intervention in the cork fish capsule intervention group and the placebo control group

Group	Weight Measurement		P-value	Difference
	Before	After		
	mean±SD	mean±SD		
Intervention	53.20±4.71	58.20±3.35	0.025***	5.00±1.87
Control	50.40±5.94	49.20±6.34	0.109**	-1.2±1.30
P-value	0.433*	0.023*		0.000*

\* Independent t-test

\*\* Paired t-test

\*\*\* Mann Whitney Test

Analysis in the intervention group showed a significant increase in weight ( $p = 0.025 < 0.05$ ) between before and after the intervention from 53.2 to 58.2 with a difference of 5.00. Analysis in the control group showed a decrease in weight ( $p = 0.109 > 0.05$ ) between before and after the intervention 50.4 to 49.2 with a decrease of 1.2, as shown in table 1 (Joshua, 2016).

### 3. Biochemical Examination Results

#### a. Albumin

Albumin levels in the blood after 30 days of intervention can be seen in the table below:

**Table 2:** Average albumin values before and after the intervention in the cork fish capsule intervention group and the placebo control group

Group	Measuring Albumin		P-value	Difference
	Before	After		
	mean±SD	mean±SD		
Intervention	2.52±0.43	3.24±0.21	0.024**	0.72±0.45
Control	3.68±0.23	3.72±0.25	0.178**	0.04±0.05
P-value	0.001*	0.011*		0.008***

\* Independent t-test

\*\* Paired t-test

\*\*\* Mann Whitney Test

Analysis in the intervention group showed a significant increase in albumin levels ( $p = 0.024 < 0.05$ ) between before and after the intervention from 2.52 to 3.24 with a difference of 0.72. Analysis in the control group showed no significant increase in albumin ( $p = 0.178 > 0.05$ ) between before and after the intervention from 3.68 to 3.72 with a difference of 0.04 increase as shown in table 13.

#### a. CD4

The results of biochemical examinations for CD4 levels of research subjects are shown in the table below.

**Table 3:** Mean CD4 cell counts after and before the intervention in the cork fish capsule intervention group and the placebo control group

Group	Pengukuran CD4		P-value	Difference
	Before	After		
	mean±SD	mean±SD		
Intervention	222.60±197.57	234.60±191.25	0.025**	12.00±7.65
Control	475.60±110.90	472.40±112.57	0.306**	-3.2±6.10
P-value	0.037*	0.043*		0.008*

\* Independent t test

\*\* Paired t test

Analysis in the intervention group showed a significant increase in CD4 levels ( $p = 0.025 < 0.05$ ), between before and after the intervention from 222 to 234, with a difference in increase of 12.00, as shown in table 3. Analysis in the control group, showed there was no significant difference before and after the intervention ( $p = 0.306 > 0.05$ ) however there was a decrease of 3.2 in CD4 levels from 475 to 472. The figure above shows that there was an increase in CD4 cell count in the cork fish intervention group after 1 month of treatment (Jayakumar, 2016). In the placebo control group, there was no increase in CD4 cell count after 1 month of treatment.

## Conclusion

Based on the results of the study it can be concluded that PLWHA given cork fish capsule supplements for 1 (one) month can improve nutritional status and increase their body weight compared to PLWHA who are only given antiretroviral therapy (ARV) without cork fish supplements. PLWHA who are supplemented with cork fish capsules can experience an increase in albumin after one month of intervention rather than only taking ARV drugs. PLWHA supplemented with cork fish capsules can experience an increase in CD4 cell count, after being intervened for one month instead of only taking ARV drugs.

## REFERENCES

Arwam, HMZ. 2011. "Behavior and Risk of Outbreaks of HIV-AIDS in Papua, Doctoral Dissertation at Gadjah Mada University, Yogyakarta.

Ashari, N. 2011. "The Effect of Provision of Cork Fish Extract on Hasanuddin Increased Immunity of People with HIV / AIDS", Thesis Post-Graduate at Makassar University.

Papua AIDS Commission, 2014, Report on HIV and AIDS Cases.

Baker R, HIV Viral load supercedes Ed4 count as best marker for pre-dicting risk of AIDS and death. Available from: <http://www.Sfaf.Org/treatment/beta/b29/b29vload.Html>

Ball, S: C. 2002. Question about HIV and Pregnancy, (cited 2011, april 6).

Barlet, J., Gallant, J., and Phan. P. 2009. Medical management of HIV Infection 2009. Thompson Reuters West.

Barre-Sinoussi, F., Cherman, J, C.Rey, F., Nugeyre, MT., Chamaret, S., Gruest, J., Dauguet, C, Axler-Blin, C, Vezinet-Brun. F, Rou Zioux, C, Rozenbaum, W. And Montagnier, L, (1983) Isolation of a T-lymphotropic retrovirus from a patient at risk for acquired immune deficiency syndrome (AIDS) Science 220, 868-871

Baratawidjaja, KG, Rengganis I. Immunology Dasa, 10th Edition Jakarta, FK UI UI Public Library, 2010.

Batterham.J.Maarijka. Investigation of Heterogenety in Studies of Resting Energy Journal of Clinical Nutrition, 2005,81: 702-13.

Capallo J. Study of Amino Acid Albumin and Mineral Zinc Profile in cork fish (Ophichepalus stritus) and Tomang fish, Malang Unibraw Fisheries Faculty. 1998

Damburam, A.Garbati.W.A. and Yusup.H.2012. "Serum proteins in health and in Patients with pulmonary tuberculosis in Nigeria" Department of Medicine. Federal Medical Center. Adamawa State, Yola. Nigeria. Journal of Infectious Diseases and Immunity Vol 4 (2).p.16-18.

Ministry of Health, 1995. Guidelines for Measurement of Upper Arm Circumference Measurement (MUAC) in Fertile Age Women. Jakarta



Ministry of Health, 2004 Counseling training modules and HIV voluntary testing

Ministry of Health, 2005. Guidelines for voluntary HIV / AIDS counseling and testing services. Attachment to the Minister of Health Republic of Indonesia NO.507 / MENKES / SK / X / 2005.

Ministry of Health (2006) National Guidelines for Preventing HIV Transmission from Mother to Baby Jakarta: Directorate General of Community Health Development.

Dimzon, LKD, Valcie, M.F., Santos, J.E.R., Garrovillas, M, J.M Dejarne, H.M. Renollo, J.M.W., Deyrit, F.M.2011. "Physico-Chemical and Department of Microbiological Parameters in the Deterrioration of Virgin Coconut Oil". Of Chemistry, School of Science and Engineering, Ateneo de Manila University, Loyola Heights, Quezon City, Philippines 1108.

Eddy S Potential Serum Albumin, 2003. (<http://www.kompas.com/jatim/print.htm> accessed August 9, 2006)

Friss Henrik (2005). Micronutrients and HIV Infection: a Review of Curren Evidence. World Health Organization Department of Nutrition for Health and Development. Durban South Africa

Farook J, Abramson S, William HC. The Protein Metabolic Response to HIV Infection. Am J Clin Nutr. 2003; 78 (1): 182-189.

Green, A.M, Robert DIFazio, R, Flynn, JL. 2000.IFN- $\gamma$  from CD4 T Cells Essential for Hest Survival and Enhances CDS T Cell Function during is Mycobacterium tuberculosis Infection. the Journal of Immunology

Holmes King K, Sparking PF, Starmm WE, Piot P, Wasserheit, JN, Corney L. et al. Sexually Transmitted Diseases. 4th ed New York: McGraw-Hill; 2008

Herfindal, E.T. and Gourley, D.R., 2000, Texbook of Therapeutics: drug and disease Management, 1555,1558, Lippincott Williams & Wilkins, Philadelphia.

Ivers LC, Cullen KA, Kenneth A, Freedburg BS. Coates J, et al. HIV AIDS, Udenutrition and Food Insecurity. J.Chinical Infectious Diseases, 2009; 49 (7): 1096-1102.





Ismail, R., Zakuan, Z. Z. M., Yusoff, S. S. A., Isa, S. M., & Manap, N. A. (2018). Consumers Basic Right to Housing: The Role of Institutional Frameworks in Malaysia. *International Journal of Asian Social Science*, 8(8), 501-508.

Jayakumar, R. (2016). Opinion of the university teachers towards educational television programmes. *American Journal of Education and Learning*, 1(1), 45-52.

Joshua, O. O. (2016). Hunger and Malnutrition: Review of Copenhagen Consensus Challenge Paper 2004. *American Journal of Social Sciences and Humanities*, 1(2), 85-99.

Joyvice, C., Atemnkeng, J. T., Sama, M. C., Mbu, S. A., & Neba, N. B. (2019). The Effect of Deceptive Marketing Communication on the Brand Equity of Private Higher Education Institutions (PHEIs) in the Northwest and Southwest Regions of Cameroon. *International Journal of Social and Administrative Sciences*, 4(1), 1-13.

Jain, A.Sherwal.B.L.Khanna, A.2010. Nutritional Status in Multi Durgs Resistance Pulmonary Tuberculosis Pattiens *International Journal of Pharma and Bio Sciences*; pp 1-5

Jahoor Farook, Abramson S, Heird C William. (2003). The Protein Metabolic esponse to HIV Infection, *American Journal of Clinical Nutrition*; 78; 182-9

Jourdain, G, Mary, J, Y. Coeur, SL, Ngo-Giang-Huong, N, Yuthavisuthi P, Limtrakul, A, Traisathit, P. Mcintosh, K., Lallebart, M. Risk Factors for Utero or Intrapartum Mother-to-Child Transmission of Human Immunodeficiency Virus Type 1 in Thailand, (cited 2014, oct 3). Available from: [http // www.ncbi.nlm.nih.gov / pubmed / 18008246](http://www.ncbi.nlm.nih.gov/pubmed/18008246)

Kartasapoerta (2005). *Nutrition (Correlation of Nutrition, Health and Work Productivity)*. Rineke Cipta Jakarta

Kandhro, D., & Pathrannarakul, P. (2013). The role of technology in enhancing transparency and accountability in public sector organizations of Pakistan. *International Journal of Economics Business and Management Studies*, 2(1), 20-24.

RI Ministry of Health, 2011. *Clinical management of HIV infection and antiretroviral therapy in adults*

RI Ministry of Health, 2012. *National Guidelines for Preventing HIV Transmission from Mother to Child (PPA)*



Ministry of Health, 2012. Report on Mathematical Modeling of the HIV Epidemic in Indonesia Jakarta RI Ministry of Health

Ministry of Health 2014. Statistics on Cases of HIV / AIDS in Indonesia

AIDS Commission 2016, Annual HIV Development Report in Papua. Papua Province KPA.

Papua Province AIDS Commission 2012. Prevalence of HIV Disease in Papua Annual KPA report for 2012

Leno Jenita. 2014. Albumin nanoparticles for the delivery of international preparation, characterization and pharmacodynamic studies.

Lesuy, S.F and 363 Tomaro, M.L. 1994. "Heme oxygenase and oxidative stress: Evidence of involvement of bilirubin as physiological protectors Against oxidative damage" Biochem. Biophys. Acha, 12,239-244

Linder. Biochemical Nutrition and Metabolism, Universitas Indonesia Jakarta 1992

Maryunani, A., Aeman, U, 2009. Handbook on Prevention of HIV Transmission from mother to baby; Management in the Trans Info Media midwifery service, Jakarta.

McFarland, Elizabeth. J. 2003. National Guidelines for the Prevention of HIV Transmission from Mother to Child (PPIA) Second Edition. Jakarta Ministry of Health Republic of Indonesia.

Mehta SH, Astemborski J, Sterling TR, Thomas DL, Vlahov D. Serum albumin as a prognostic indicator for HIV disease progression. AIDS Reshum Retroviruses 2006; 22: 14–21.

Moodley, J. 2005. Management of Human Immunodeficiency Virus Infection in Pregnancy, (cited 2011, april 2). Best Practices & Research Clinical Obstetrics & Gynecology. Available from: <http://www.sciencedirect.com/science/article/pii/S152169340400149>

Nadhiroh. Good Nutrition for Quality of Life of PLWHA (People Living with HIV / AIDS). 2006; 3 (2): 29-34

Nasronuddin, 2007. HIV and AIDS, Molecular, Clinical and social Biological Approaches. Hospital AIDS Medical Team Dr. Soetomo. FK Unair



National Food and Nutrition Commission (NFNC), Nutrition For Care and Support of People Living With HIV and AIDS. Lusaka Ministry of Health. 2011).

Narwadiya, S.C., Dhumne, U.L. Sahare, K.N Turmane P.M. Meshram, V.G. Sing, V. 2012. "Changes in Dots Administered Patient Level of Nagpur District Serum Protein Level. A. Case Study.P.G.Department of Microbiology, R.T. M Nagpur University, Ngpur-440 033, Maharashtra, India. ASIAN J EXP. BIOL.SCI VOL.3 (1): 251-254.

Nicholas I paton, Ng you-ming, Chee BE cynthia, Persaud C, Jackson A Alan (2003). Effects of Tuberculosis and HIV infection on Whole-body protein metabolism during feeding, Amercan Journal Clinical Nutrition; 78; 319-25

Ockengaa J, Grimbleb R, Jonkers-Schilenas C, Macalland D, Melchio JC, Sauweinf HP, et al. ESPEN Guidelines on Entera Nutrition: Wasting in HIV and other chronic infectious Disease J.Cin Nutr, 2006; 25: 319-29.

Paton NI, Ming NY, Chintya CB, Persaud C, Alan JA. Effect of Tuberculosis and HIV Infection on Whole-body Protein Metabolism During Feeding and J Clin Nutr: 2003.7 (2): 319-25.

Restiana 2010. The effect of cork fish extract on albumin levels and nutritional status of HIV / AIDS sufferers receiving ARV therapy at the Hasanuddin University Makassar Postgraduate.

Sadikin Mohammad. Blood Biochemistry. Widya Medika (2002)

Stepanuk 2000. Biochemical and Physiological Aspects of Human Nutrition. Wb. Saunders company. Philadelphia Pennsylvania.

Sudiono, H. Iskandar, I, Edward, H., Halim, S.L, Santoso, R. 2007. Guides for Pathology of Hematology Clinics. UKRIDA Faculty of Medicine Clinical Pathology Division. Printing Megah Perkasa Perkasa. Second printing, pp. 38-41

Sunatrio, S. .. Role of Albumin in Critical Diseases; in the Consensus of Giving Albumin in Cirrhosis of the Liver. Jakarta: UI Pres, 2003.

Septkowitz, K.A. "AIDS-The First 20 years" .N.Engl.j.Med.2001 344 (23): 176472.



Thapa, B.R, Walia, A. (2007). Liver Function Tests and Their Interpretation. Indian Pediatrics 74 (7): 663-671.

Taslim, NA, et al., 2005. "Making Cork Fish Flour as an Additional Food Source of Albumin and its Utilization". Center for Food, Nutrition and Health Research. Hasanuddin University of Makassar

Taslim NA, Cork fish benefits for health. Makasar Hasanuddin University research report 2012. Available From: [www.pujiminkapsul.wordpress.com](http://www.pujiminkapsul.wordpress.com) on 20 September 2013.

World Health Organization, Participant Statement. Presented paper at WHO Consultation on Nutrition and HIV / AIDS in Africa. Durban, South Africa, 10-113 April 2005

World Health Organization, UNAIDS reports on the Global AIDS epidemic (2010).

[Www. Spiritia.com](http://www.Spiritia.com).HIV, AIDS and CD4 April 2009

[Www.Spiritia.com](http://www.Spiritia.com).Statistics on HIV / AIDS Cases in Indonesia March, 2014

Zhao, Y.F., Feng, D.D. and Chen, C. (2006). Contribution of adypte-derivative factors to beta cell dysfunction in diabetes, Int. J. Biochem.Cell Biol., 38 (5-6), 804-819.