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Impact assessment of HIV infection on biological variables in Angami Nagas: Gender differences

Athoni Rhetso and S.L. Malik[1]
[1]Department of Anthropology, University of Delhi, Delhi-110007, India

Corresponding author: Prof. S. L. Malik, Department of Anthropology, University of Delhi, Delhi-110007, e-mail: slmalik@rediffmail.com

Abstract:
In order to assess gender differences for the impact of HIV infection on biological variables in Angami Nagas, a cross sectional analysis was performed comparing 400 control (HIV negative) adult Angamis (200 males and 200 females) and 60 affected (HIV positive) adult Angamis collected from Kohima, Nagaland (India). Both control males and females are significantly heavier, and have greater grip strengths, higher lung functions and marginally higher blood pressure than the respective HIV affected males and females. Gender differences as evident from two way ANOVA, of the impact of HIV infection on all the biological variables, except, stature, are significant. The effect of HIV infection (using K-Quotient) on all the biological variables is more in males than in female, except body weight.

Key words: *HIV, Angami Nagas, Nagaland, Biological variables, gender differences, ANOVA, Cardio-respiratory functions, grip strength.*

INTRODUCTION

HIV, like a pebble struck down in a pool, send out ripples to the edges of the society affecting first the family, then the community, then the Nation, as a whole, targeting predominantly the productive age group, creating social, economic and health problems-posing a threat to the survival of human beings. The virus was first discovered by French and American Scientists in 1981 in the midst of concern about a strange wasting illness (Mangili et al., 2006) that was affecting and killing adults. As it only infected and affected ‘Human beings’, this virus came to be known as ‘HIV’. Not only does this virus destroy the body’s ability to fight off diseases; it renders the immune system defenseless and vulnerable to many other infections Stigmatization worsen the impact, it hinders the prevention and treatment of HIV and hampers social support and HIV disclosure. People living with HIV have faced violent attacks, been rejected by families, spouses and communities, been refused medical treatment and even, in some reported cases, denied the last rites before they die (UNDP, 2006).

With no cure discovered for the disease yet, an estimated 33.3 million people in the world one- in every 200 are living with HIV, and daily 6800 people are infected with HIV and 750 people die of AIDS- related illness (UNAIDS, 2010). It is one of the leading causes of death in majority of developing and under developed countries. India has over approximately 3 million people living with HIV/AIDS. The scourge of HIV particularly, in the last two decade has become a major concern for Nagaland, a state in the North-Eastern part of India. It detected its ever first HIV case among the injecting drug users in 1990 by the Indian Council of Medical Research (ICMR), and is now listed as one of the six high HIV prevalent states in India, with a prevalence rate of 1.20% (NSACS, 2010).

Rates of malnutrition and food insecurity are high in the regions of the world where HIV is most endemic. A US study showed risk of HIV infection and mortality related to HIV was higher among those on low income compared to wealthier PLHIV (Cunningham et al., 2005). HIV can bring about low income, for example, due to ill health, uncertain immigration status, hate crime and discrimination. Although death from HIV and AIDS wasting has been dramatically reduced by antiretroviral therapy, some studies suggest that weight loss remains a significant complication. Other negative associations of involuntary weight loss include, a) lower CD4+ cell counts (Mangili et al., 2006), b) impaired functional status (Dudgeon et al., 2006), c) HIV RNA correlates positively with weight loss and body mass index (Dudgeon et al., 2006). In recent years this virus has infected many people as a result there is a huge increase in the incidence of respiratory tract infections worldwide (Feldman, 2005). Noninfectious pulmonary conditions such as chronic obstructive lung disease and pulmonary malignancies are gaining prominence as patients are accessing antiretroviral care and enjoying significantly extended survival. Also, the epidemic is greatly impacted by issues related to sex and gender (Forum for Collaborative HIV Research, 2002) such as disease progression and manifestations. Conducting sex comparisons is important to delineate sex differences or similarities. Thus the present study is contrived with the aim to study gender difference in the effect of HIV on biological variables in Angami Nagas of Nagaland.

MATERALS AND METHODS

The North-East region of India with its splendid heritage and ethnic diversity is inhabited by innumerable miscellanea of Indigenous groups professing a wide range of religions, culture, languages and social systems. Amidst them is one indigenous group discerned as the Nagas- a generic name for a cluster of indigenous communities inhabiting four states in India namely basis of the physical features, social patterns, religious beliefs, cultural practices, language roots, material culture, etc. scholars have suggested that they are possibly descendants of Nagaland, four districts of Manipur, one district of Assam, two districts of Arunachal Pradesh and the western parts of Myanmar. The ethnic origin of the Naga remains obscure. On the various migrant groups who came at different time from different places, in waves, possibly from Burma, Indonesia, Thailand, Borneo, the Phillipines, China and the Oceanic societies (Furer-Haimendorf, 1982; Kamie, 1996).

Figure 1: Map displaying the area of the present study

Figure 2: District map of Kohima

The largest concentration of Nagas is found in Nagaland, the sixteenth state of the Indian Union, with a population of 1,988,636 (according to the 2001 census). It is land-locked by Assam in the north-west, by the Tirap district of Arunachal Pradesh in the north-east, and by Manipur in the south, while the eastern limits of the state are on the international boundary between India and Myanmar. At present, there are sixteen official recognized tribes in the state of Nagaland, each exhibiting distinct socio-cultural characteristics from the other. As a political unit, the state of Nagaland consists of eleven administrative districts.

Kohima, the state capital is inhabited by the Angami Nagas. The territory of the Angami's (the present Kohima district), is divided into four regions: - 1) Southern Angami, 2) Western Angami, 3) Northern Angami, (4) Chakhro Angami and the former Eastern Angami, now recognised as Chakhesang. In recorded history, Angami Nagas received much attention, known to be powerful warrior people who had bitterly resented the intrusion of the Britishers. Angami inhabited villages are usually situated on the ridges or tops of mountains. Agriculture is the mainstay economy of the Angami people. They are expertise in wet terraced cultivation. Angamis have begun to recognize that an exclusive dependence on cultivation is inadequate to satisfy their growing needs, and it has directed large numbers of Angamis over the past decades to explore occupational avenues outside agriculture. This, in turn, has generated an increased interest in education. The basic interest of every Angamis is his or her family, the clan, the *khel* (smaller units comprising a few clans) and the village. Angamis strictly follow tribe endogamy and clan exogamy.

Christianity has changed the Naga society entirely and today it bears little resemblance to the tribal society that it was a century ago. The Christian missionaries interfered in the social and cultural practices to a far greater extent than the government. The new educational system and religion disrupted the indigenous pattern of life as both the British administration and the Christian missionaries brought about dramatic changes among the Naga tribes thereby affecting the tribes to discard their age old social patterns, cultural practices and traditional political setup without providing functional substitutes. It is estimated that 95 per cent of the Nagas have now embraced Christianity. Besides formal western education, over the past, various political, religious and economic developments have occasioned major shifts in cultural patterns and social structures of the Nagas (Maitra, 1998). Scholars believed that urbanization, political instability and the media have further expedited the momentum of change (Chasie, 1999; D'Souza, 1992; Channa, 1992; Lurstep, 1992; Sharma and Thienuokhrienuo, 1993), as traditional values and norms are being replaced by local sub-cultures and alien trends (Anand, 1980; Chasie, 1999; D'Suoza, 1992; Horam, 1975).

Almost 20 years into the fight against HIV/AIDS in India's north-eastern state of Nagaland, the Nagaland State AIDS Control Society (NSACS, 2010) has admitted that the state has a long way to go in arresting the epidemic. Nagaland is next to the "Golden Triangle" (Myanmar, the Lao People's Democratic Republic, and Thailand), where drug smuggling is widespread, particularly along the porous border with Myanmar; this has traditionally been viewed as the most important reason for the increase in drug use. Further, the geographic and socio-political factors combine to enhance susceptibility to drug use. Production of heroin in the Golden Triangle started in the 1970s, and cheap high quality Burmese "no. 4 heroin" (which has 80-90 percent purity, making it suitable for injection once diluted) was abundantly available in Nagaland. As a result, many users switched to smoking heroin. When poppy cultivation in the Golden Triangle diminished in the early 1990s heroin became scarce and more expensive. Law enforcement further contributed to the price rise. As a result, many heroin users switched from smoking to injecting, to obtain a maximum effect from a relatively smaller dose. The high cost of needles and syringes, fear of being exposed as a user and ignorance of the danger of unsterile needles led many injecting drug users to share needles and to fashion makeshift needles and syringes made from ink droppers. (Drug Policy Briefing Nr.35, 2011). Subsequently, the epidemic spread to the wider populations from injecting drug users (IDU) through their sexual partners (Panda et al., 2000). Different strategies have been adopted to prevent HIV transmission among injecting drug users under the aegis of National AIDS Control Organization (NACO) since 1990s, including the supply of sterile injecting equipment and condoms; awareness and education programs on HIV prevention; clinical services for treating sexually transmitted infections (STI); referral to the voluntary counseling and testing Centre (VCTC); and peer-led outreach programs. According to NSACS data, the state witnessed a drastic decline in the number of Injecting Drug Users (IDUs) from 1980s and 90s, as per records, HIV transmission through needle syringes (IDUs) was about 12 per cent in 2007-08 and it came down to 5.8 per cent in 2008-09 (NSACS, 2010). The trend also revealed that HIV infection among IDUs had shown a drastic reduction following massive awareness drive, but more and more cases of spread of the disease through heterosexual route and parent to child transmission was increasing that now encompasses all strata of the society (NACO, 2007).

A cross-sectional sample of 460 adult Angami (230 males and 230 females) belonging to the age group of 18-48 years was collected. For assessing the impact of HIV on biological variables, body weight, stature, grip strength right, grip strength left, grip strength average, lung functions (forced vital capacity, forced expiratory volume, peak expiratory flow rate) and blood pressure (systolic and diastolic blood pressure) were taken.

One way analysis of variance (ANOVA), two way analysis of variance, K-Quotient methods were used for assessing the impact of HIV on biological variables. The statistical analysis was done using SPSS 15package. To quantify gender differences, K-quotient was applied using the following formula: $K=((\bar{X}_C - \bar{X}_A) / (\bar{X}_C + \bar{X}_A)2)x100$. Where, $\bar{X}_C$= Mean value of a parameter in control, $\bar{X}_A$ =Mean value of the same parameter in affected**.** When sex difference is taken into consideration, a positive value of the index indicates that the effect is more in males than females, whereas a negative value suggests the contrary.

RESULTS AND DISCUSSION

Results for the impact assessment of HIV infection on biological variables (using one way ANOVA) and gender differences in the impact of HIV infection (using K-Quotient and two way ANOVA) are presented in the following section.

Table 1: Comparison of HIV affected and controls in Angami

Biological Variables	Angami	Males						Females					
		Descriptives			ANOVA			Descriptives			ANOVA		
		Mean	*S.D*	*C.V*	*F value*	*d.f*	*P*	*Mean*	*S.D*	*C.V*	*F value*	*d.f*	*P*
Body Weight, kg	Control	58.34	5.24	8.99	43.174*	1/229	.001	50.02	3.37	6.75	213.027*	1/229	.000
	HIV affected	52.02	0.81	1.55				40.97	0.85	2.08			
Stature, cm	Control	166.16	3.74	2.25	0.002	1/229	.965	154.01	3.70	2.42	3.229	1/229	.074
	HIV affected	166.19	2.42	1.46				155.24	0.78	0.51			
Grip Strength Right, kg	Control	44.49	4.38	9.84	48.199*	1/229	.000	24.48	1.80	7.33	19.612*	1/229	.000
	HIV affected	38.30	5.61	14.64				22.97	1.36	5.93			
Grip Strength Left, kg	Control	42.85	4.20	9.87	44.993*	1/229	.000	23.88	1.59	6.65	61.780*	1/229	.000
	HIV affected	37.00	5.78	15.63				21.45	1.42	7.12			
Grip Strength Average, kg	Control	43.67	4.00	9.68	48.198*	1/229	.000	24.18	2.34	6.57	41.425*	1/229	.000
	HIV affected	37.65	5.63	14.95				22.12	1.35	6.33			
FVC, l	Control	3.35	4.54	10.13	110.338*	1/229	.000	2.94	4.36	8.11	129.600*	1/229	.000
	HIV affected	2.66	6.60	11.98				2.41	5.40	12.20			
$FEV_{1,}$ l	Control	2.96	4.05	10.53	135.000*	1/229	.000	2.46	4.12	9.69	94.624*	1/229	.000
	HIV affected	2.25	7.12	13.76				2.00	3.38	12.20			
PEFR, l/min	Control	437.49	20.04	16.31	111.004*	1/229	.000	342.10	16.45	14.19	108.632*	1/229	.000
	HIV affected	293.57	24.35	19.76				244.53	20.23	17.32			
Blood Pressure Systolic, mmHg	Control	127.29	6.61	5.19	106.352*	1/229	.000	115.63	9.38	8.11	10.623*	1/229	.001
	HIV affected	114.07	6.00	5.36				109.73	8.18	7.46			
Blood Pressure Diastolic, mmHg	Control	86.38	4.48	6.36	131.978*	1/229	.000	76.89	7.43	9.89	19.321*	1/229	.000
	HIV affected	74.00	5.58	7.54				70.47	6.75	9.59			

*Significant at 5% probability level, Control (N) =400 (200 males, 200 females); HIV affected (N) = 60(30 males, 30 females)

Table 2: Body Weight in Angamis, by gender and HIV infection

Source	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	11838.724(a)	3	3946.241	231.170	.000
Intercept	528749.479	1	528749.479	30974.098	.000
Gender	4896.821	1	4896.821	286.855	.000
HIV	3079.680	1	3079.680	180.407	.000
Gender * HIV	97.271	1	97.271	5.698	.017
Error	7784.238	456	17.071		
Total	1320267.510	460			
Corrected Total	19622.962	459			

a R Squared = .603 (Adjusted R Squared = .601)

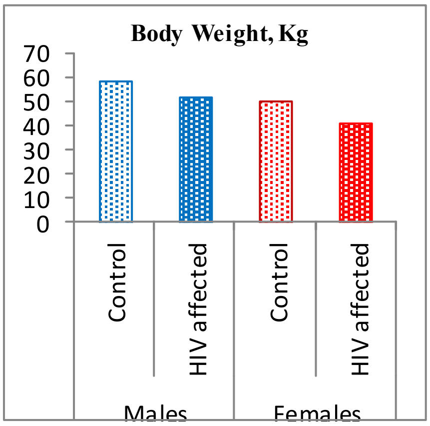

Figure 3: Comparision of Body Weight in Control and HIV affected

Description of body weight in control and HIV affected Angamis are given in Table 1 and illustrated in Figure 3. Control males and females are significantly heavier than the respective HIV affected males and females. They also exhibit higher variability in body weight when compared with HIV affected males and females respectively.

From the two way analysis of variance it is evident that males are significantly heavier than the females at 5% probability level (Table 2). Here, females show greater impact of HIV infection on body weight than males, with over 60% of the variation in body weight interpretable by the interaction of gender and HIV infection.

Table 3: Stature in Angamis, by gender and HIV infection (two way ANOVA

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	16567.044(a)	3	5522.348	439.247	.000
Intercept	5369240.759	1	5369240.759	427068.526	.000
Gender	6954.808	1	6954.808	553.184	.000
HIV	20.713	1	20.713	1.648	.200
Gender * HIV	18.715	1	18.715	1.489	.223
Error	5732.976	456	12.572		
Total	11822664.610	460			
Corrected Total	22300.020	459			

a R Squared = .743 (Adjusted R Squared = .741)

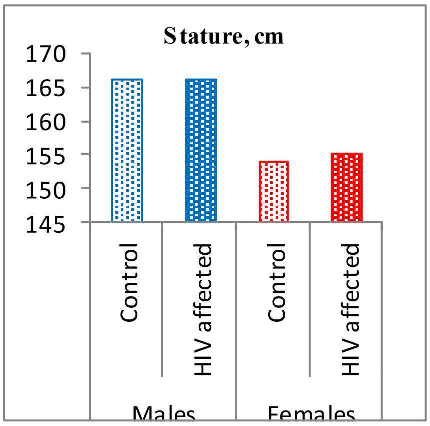

Figure 4: Comparison of Stature in Control and HIV affected

Particulars of stature in controls and HIV affected Angamis are outlined in Table 1 and presented in Figure 4. Non-significant differences are noted in stature when control males and females are compared with HIV affected males and females. Values for coefficient of variation reveals variability in stature is more pronounced among control males and females.

Results of two way ANOVA (Table 3) in stature establishes a significant gender differences at 5% probability level in stature, and a non-significant difference between HIV affected and control in both males and females. Once there is no impact of HIV on stature, it is not relevant to examine the gender differences of the HIV impact on stature, which is of course non-significant. Here over 74% of the variance in stature is explainable by the interaction of gender and HIV infection.

Table 4: Right Hand Grip Strength in Angamis, by gender and HIV infection (two way ANOVA)

Source	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	44323.289(a)	3	14774.430	1242.228	.000
Intercept	221263.037	1	221263.037	18603.709	.000
Gender	16286.516	1	16286.516	1369.364	.000
HIV	774.152	1	774.152	65.090	.000
Gender * HIV	285.195	1	285.195	23.979	.000
Error	5423.432	456	11.893		
Total	581024.030	460			
Corrected Total	49746.720	459			

a R Squared =.891 (Adjusted R Squared = .890)

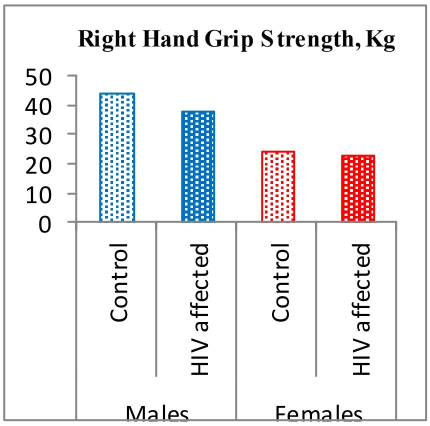

Figure 5: Comparison of Right Hand Grip Strength in Control and HIV affected

Table 5: Left Hand Grip Strength in Angamis, by gender and HIV infection (two way ANOVA)

Source	Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	40508.448(a)	3	13502.816	1207.888	.000
Intercept	204408.055	1	204408.055	18285.224	.000
Gender	15543.005	1	15543.005	1390.392	.000
HIV	895.320	1	895.320	80.090	.000
Gender * HIV	152.562	1	152.562	13.647	.000
Error	5097.562	456	11.179		
Total	541312.750	460			
Corrected Total	45606.010	459			

a R Squared =.888 (Adjusted R Squared = .887)

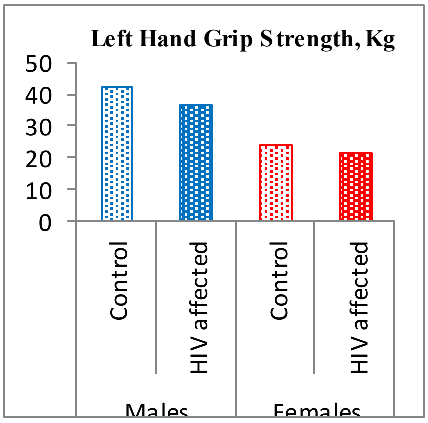

Figure 6: Comparison of Left Hand Grip Strength in Control and HIV affected

Particulars of right and left hand grip strength in controls and HIV affected Angamis are given in Tables 1 and Figures 5 and 6. Both right and left hand grip strengths are significantly greater in control males and females than HIV affected males and females respectively. Outcome also divulges a pronounced variability in right and left hand grip strength among HIV affected males when equated with control males. In females, the control group exhibits more variability in right hand grip strength, while a reverse trend is observed in left hand grip strength.

Angami males' exhibit significantly greater right and left hand grip strengths at 5% probability level than their counterpart females (Tables 4 and 5). Males show greater impact of HIV infection on right and left hand grip strengths than females, with 89% and 88% of the variance in right and left hand grip strength interpretable by the interaction of gender and HIV infection.

Table 6: Average Grip Strength in Angamis, by gender and HIV infection (two way ANOVA)

Source	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	42387.754(a)	3	14129.251	1280.116	.000
Intercept	212752.089	1	212752.089	19275.424	.000
Gender	15912.589	1	15912.589	1441.687	.000
HIV	833.635	1	833.635	75.528	.000
Gender * HIV	213.734	1	213.734	19.364	.000
Error	5033.091	456	11.037		
Total	560758.820	460			
Corrected Total	47420.844	459			

a R Squared =.894 (Adjusted R Squared = .893)

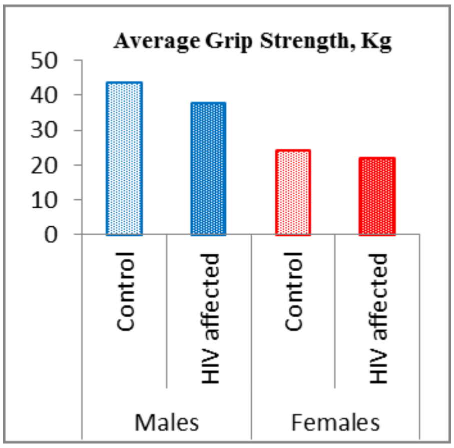

Figure 7: Comparison of Average Grip Strength in Control and HIV affected

Description of average grip strength in controls and HIV affected Angamis are outlined in Table 1 and portrayed in Figure 7. Control males and females display significantly greater average grip strength than the respective HIV affected males and females. While, values for coefficient of variation delineate that HIV affected males are much more heterogeneous in the average grip strength than control males, while a reverse trend is noted in females.

Angami males have significantly higher average grip strength than the females (Table 6). Males show greater impact of HIV infection on average grip strength than females. Over 89% of the variance in average grip strength is interpretable by the interaction of gender and HIV infection.

Table 7: Forced Vital Capacity in Angamis, by gender and HIV infection (two way ANOVA)

Source	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	38.102(a)	3	12.701	149.191	.000
Intercept	1682.283	1	1682.283	19761.387	.000
Gender	5.941	1	5.941	69.786	.000
HIV	19.522	1	19.522	229.317	.000
Gender * HIV	.352	1	.352	4.132	.043
Error	38.819	456	.085		
Total	4398.939	460			
Corrected Total	76.921	459			
a R Squared =.495 (Adjusted R Squared = .492)					

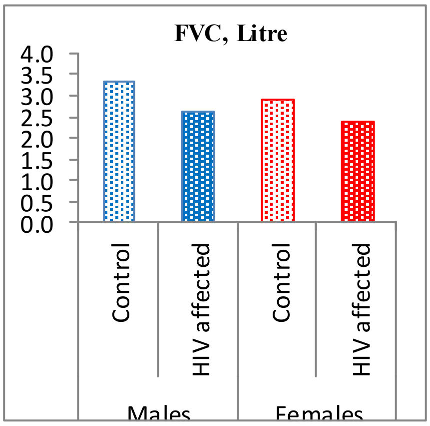

Figure 8: Comparison of Forced Vital Capacity in Control and HIV affected

Table 8: Forced Expiratory Volume in Angamis, by gender and HIV infection (two way ANOVA)

Source	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	44.183(a)	3	14.728	191.167	.000
Intercept	1219.383	1	1219.383	15827.856	.000
Gender	7.476	1	7.476	97.043	.000
HIV	17.657	1	17.657	229.190	.000
Gender * HIV	.844	1	.844	10.959	.001
Error	35.130	456	.077		
Total	3266.402	460			
Corrected Total	79.313	459			
a R Squared =.557 (Adjusted R Squared = .554)					

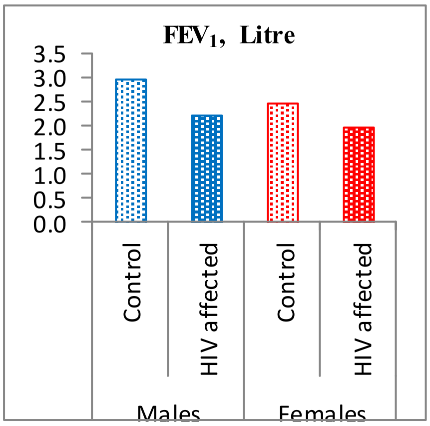

Figure 9: Comparison of Forced Expiratory Volume in Control and HIV affected

Description of forced vital capacity and forced expiratory volume in controls and HIV affected Angamis are given in Table 1 and presented in Figures 8 and 9. Forced vital capacity and forced expiratory volume are significantly greater in control males and females when compared with HIV affected males and females respectively. Higher variability in forced vital capacity and forced expiratory volume is observed among HIV affected males and females.

Outcome of two way ANOVA (Tables 7 and 8), establishes that males have significantly greater forced vital capacity and forced expiratory volume than females. Here, males depict greater impact of HIV infection on forced vital capacity and forced expiratory volume than females, with 49.2% and 55.4% of the variance in forced vital capacity and forced expiratory volume explainable by the interaction of gender and HIV infection.

Table 9: Peak Expiratory Flow Rate in Angamis, by gender and HIV infection (two way ANOVA)

Source	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1706588.232(a)	3	568862.744	159.048	.000
Intercept	22647138.031	1	22647138.031	6331.904	.000
Gender	272062.164	1	272062.164	76.066	.000
HIV	760599.005	1	760599.005	212.656	.000
Gender * HIV	28029.659	1	28029.659	7.837	.005
Error	1630961.983	456	3576.671		
Total	67694723.000	460			
Corrected Total	3337550.215	459			

a R Squared = .511 (Adjusted R Squared = .508)

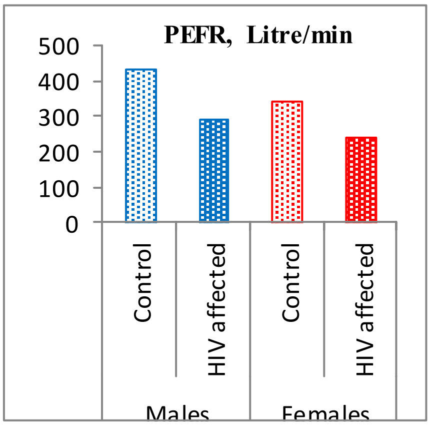

Figure 10: Comparison of Peak Expiratory Flow Rate in Control and HIV affected

Descriptive statistics of peak expiratory flow rate in controls and HIV affected Angamis are drafted in Table 1 and depicted in Figure 10. Both control males and females have a significantly greater peak expiratory flow rate than HIV affected males and females. Values for coefficient of variation reveals variability in peak expiratory flow rate is more pronounced among HIV affected males and females.

Angami males have significantly greater peak expiratory flow rate than Angami females (Table 9). The impact of HIV infection on peak expiratory flow rate is greater in males than in females, with 50.8% of the variance in this parameter interpretable by the interaction of gender and HIV infection.

Table 10: Systolic Blood Pressure in Angamis, by gender and HIV infection (two way ANOVA)

Source	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	18654.757(a)	3	6218.252	97.061	.000
Intercept	2841168.146	1	2841168.146	44347.986	.000
Gender	3338.435	1	3338.435	52.110	.000
HIV	4765.868	1	4765.868	74.391	.000
Gender * HIV	701.130	1	701.130	10.944	.001
Error	29213.788	456	64.065		
Total	6695169.000	460			
Corrected Total	47868.546	459			

a R Squared = .390 (Adjusted R Squared = .386)

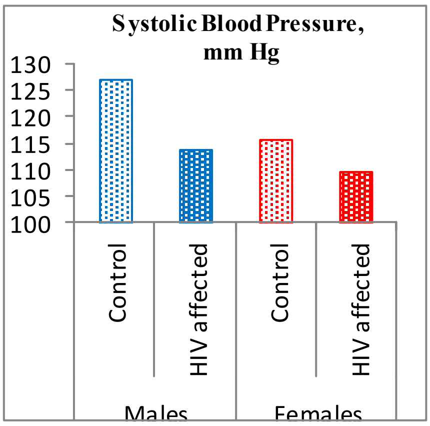

Figure 11: Comparison of Systolic Blood Pressure in Control and HIV affected

Table 11: Diastolic Blood Pressure in Angamis, by gender and HIV infection (two way ANOVA)

Source	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	13946.877(a)	3	4648.959	110.322	.000
Intercept	1234438.939	1	1234438.939	29293.869	.000
Gender	2246.372	1	2246.372	53.308	.000
HIV	4562.800	1	4562.800	108.278	.000
Gender * HIV	478.477	1	478.477	11.354	.001
Error	19215.767	456	42.140		
Total	3004104.000	460			
Corrected Total	33162.643	459			
a R Squared = .421 (Adjusted R Squared = .417)					

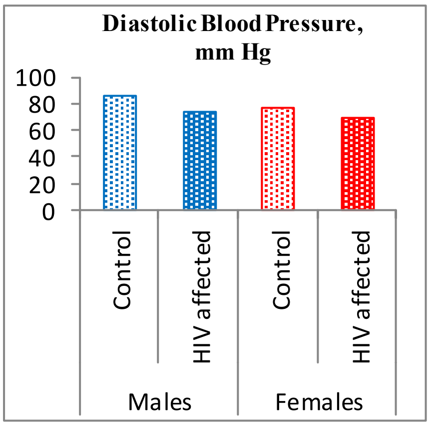

Figure 12: Comparison of Diastolic Blood Pressure in Control and HIV affected

Description of blood pressure (systolic and diastolic) in males and females of controls and HIV affected Angami are given in Table 1 and depicted in Figures 11 and 12. Blood pressure (systolic and diastolic) is significantly lower in HIV affected males and females when equated with control males and females respectively. Values for coefficient of variation also suggest that HIV affected males are more heterogeneous blood pressure than control males, while a reverse trend is noted in females.

Angami males have significantly higher systolic and diastolic blood pressure than their counterpart females at 5% probability level, (Table 10 and Table 11). Males show greater impact of HIV infection on blood pressure (systolic and diastolic) than females. 38.6% and 41.7% of the variance in systolic blood pressure and diastolic blood pressure are interpretable by the interaction of gender and HIV infection respectively.

Table 12: Impact of HIV and Gender differences between Control and HIV affected in Angamis

Biological variables	Value of K Quotient		Gender differences
	Males	Females	
Body Weight, kg	11.45	19.89	-8.44
Stature, cm	-0.02	-0.08	0.06
Grip Strength Right, kg	14.95	6.36	8.59
Grip Strength Left, kg	14.65	10.72	3.93
Grip Strength Average, kg	14.81	8.90	5.91
FVC, l	22.96	19.81	3.15
$FEV_{1,}$ l	27.26	20.63	6.63
PEFR, l/min	39.37	33.26	6.11
Blood Pressure Systolic, mm Hg	10.95	5.24	5.72
Blood Pressure Diastolic, mm Hg	15.44	8.71	6.72

For K-Quotient, refer to Material and Methods

The advantage of K-Quotient is that it allows comparison of impact across gender and between variables. Both signs and values of K are important. The former indicates which of the gender is much more affected, whereas its value shows the magnitude of impact on the biological variable. In males, lung functions and strengths are the most affected, followed by blood pressure (Table 12). Weight is also drastically reduced, whereas not much difference is noted in stature. In females, lung functions and body weight are the most affected, pursued by strengths and blood pressure; stature does not depict much difference. The impact of HIV infection on all the parameters is much more pronounced in males than in females, except body weight.

Despite major advances in the treatment and survival of patients infected with human immunodeficiency virus (HIV), weight loss and wasting remain common problems (Mangili et al., 2006). Wanke and co-workers (2000) found that 18 percent of patients in a cohort of HIV positive subjects in Boston lost more than 10 percent of their body weight over serial visits and 21 percent had a sustained loss of more than 5 percent body weight for 1 year (Wanke et al., 2000). As observed in our study, both HIV affected males and females exhibit more than 5% loss of body weight when compared with control males and females. Also the impact of HIV infection on body weight between males and females is dissimilar, with loss of weight much more pronounced in females. In contrast there is not much difference in stature between controls and HIV affected in both males and females. Decreased nutritional status in HIV-infected patients is associated with disease progression, increased morbidity and reduced survival, independent of immunodeficiency and viral load (Hsu et al., 2005; Ockenga et al., 2006). Disease progression further leads to decreased muscular strength and functional performance (Dudgeon et al., 2006).

The present study purports that strength, as evident from grip strength, and functional performance as apparent from lung functions, is lower in HIV affected males and females than in their respective controls. Further, the impact of HIV infection on grip strength and lung fuctions is much more marked in males than in females. In case of HIV affected males, both systolic and diastolic blood pressure are lower than the normal expected range recommended by World Health organization, where blood pressure of 120/80 is considered as normal (WHO, 2011). Both control and affected females have lower blood pressure (systolic and diastolic), but it is much lower in the affected group. The impact of HIV infection on blood pressure (systolic and diastolic) is slightly more in males.

To conclude, the effect of HIV is evident on body weight, grip strength, respiratory functions and to some extent on cardio-respiratory system.

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