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Special Issue

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Technical Assistance

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Factors affecting high-density lipoprotein cholesterol in HIV-infected patients on nevirapine-based antiretroviral therapy

Long-term use of antiretroviral therapy (ART) has reduced the morbidity and mortality due to HIV infection but has also led to dyslipidaemia, characterized by an increase in levels of total cholesterol (TC), low-density lipoprotein cholesterol (LDL-C), triglycerides (TG) and varying effect on high-density lipoprotein cholesterol (HDL-C)[1],[2],[3]. Alterations in these lipid levels may lead to an increased risk of cardiovascular disease (CVD), observed in both developed and resource-limited settings [3],[4]. The changes seen in lipid levels appear to be related to both drug classes [nucleoside reverse transcriptase inhibitors (NRTIs) and non-nucleoside reverse transcriptase inhibitors (NNRTIs)] and specific agents [zidovudine and nevirapine (NVP)][5],[6]. For example, NVP-based regimens show larger increases in HDL-C and relative decreases in TC:HDL-C ratio than efavirenz-containing regimens and thus could be associated with a lower atherogenic lipid profile [7].

HDL, a lipoprotein responsible for the efflux and transport of blood cholesterol, plays an essential role in preventing atherosclerosis and cardiovascular events [8]. A low level of HDL-C has been shown to be a risk factor for CVD in general population [9]. Both HIV infection and ART can influence HDL-C levels, with NVP being associated with greater increase in HDL-C levels than efavirenz [6],[10]. At the same time, strong genetic influence also exists on plasma HDL-C levels. Defects in the genes coding for cholesteryl ester transfer protein (*CETP*), lipoprotein lipase (*LPL*), apolipoprotein A1, lecithin cholesterol aceyltransferase (*LCAT*), *etc*,

can result in large changes in HDL-C levels as does apolipoprotein C3 (*APOC3*) for cholesterol [8],[11],[12]. *APOC3* promoter polymorphism is also associated with a greater likelihood of metabolic syndrome and dyslipidaemia, especially higher TG and lower HDL-C, among Indian population as well, after controlling for age, race and gender [13],[14],[15]. Though functional defects of these genes are rare in the general population and mostly concern only small numbers of patients, premature truncation of the LPL protein (447 stop), polymorphism in *CETP* (rs4329913 and rs7202364) gene and *APOC3* promoter variant (C-482T and T-455C) have been shown to be relatively frequent and account for significant changes in lipid levels in various groups of population [16],[17].

The high degree of risk for CVD in Indians is characterized by various combinations of either hypertriglyceridaemia with low HDL cholesterol or an increase in TC, LDL cholesterol and TC/HDL ratio [18],[19]. Studies have shown significantly lower HDL-C among HIV-positive as compared to HIV-negative individuals (43 vs. 75%, *P* <0.001), especially in treatment-naïve HIV-infected individuals with low CD4 cell counts [20],[21],[22]. With immunological restoration following initiation of ART, HDL-C returns to normal range. However, we have previously reported that almost 25 per cent of HIV-infected adults have lower levels of HDL-C even after 12 months of NNRTI-based ART [23]. This study was aimed to look at the factors and impact of certain baseline characteristics, CVD risk scores as well as polymorphisms in *APOC3*, *CETP* and *LPL* genes on lipid profile of HIV-infected adults after 12-15 months of NVP-based ART.

Material & Methods :

A cross-sectional study was conducted at the National Institute for Research in Tuberculosis, Chennai, India, between January 2013 and July 2014. HIV-infected adults of 18 yr and above, on an NVP-based ART regimen (dose of NVP: 200 mg twice a day along with two NRTI drugs) for the last 12-15 months, from ART centres in Government Hospital of Thoracic Medicine, Government General Hospital, Chennai, and Government Vellore Medical College and Hospital, Vellore, were approached for the participation in this study. Patients seriously ill, on efavirenz-based ART, had ART changed or interrupted for more than one month continuously any time during the preceding 18 months or on the second-line ART were not included in this study. The Institutional Ethics committee of the National Institute for Research in Tuberculosis, Chennai, approved this study. Before enrolling into the study, informed written consent was obtained from all patients.

Study procedures: A detailed clinical, socio-demographic and personal history, including smoking and alcohol intake, was collected using a structured questionnaire. Details on drug adherence over the last one year was retrieved from patient's ART notebooks that had information on number of pills supplied, number of pills returned and number of missed doses and by a basic five-point Likert scale for self-rating of overall adherence as all the time (excellent), most of the time (very good), many times (good), occasionally (fair) and never.

Height, weight, mid-arm, waist and hip circumferences were measured. Blood pressure was recorded in the left arm in sitting posture. After an overnight fast, blood samples (10 ml) were collected for lipid profile which included TC, HDL-C, LDL-C, TG and blood glucose, measured by an automated analyzer (Olympus AU400, Japan). A 10-yr risk for coronary heart disease was estimated using the Framingham's Point scores [24]. Plasma samples were also subjected to viral load assay by Roche COBAS AmpliPrep/COBAS TaqMan HIV-1 Test v2.0 (USA) and CD4 cell counts by FACS count flow cytometer (Becton Dickinson, USA). Participants were genotyped for the polymorphisms in *APOC3* gene (rs2854116, rs2854117 and rs5128) by previously described primers using polymerase chain reaction (PCR) followed by sequencing assay [14],[25]. The single nucleotide polymorphism (SNP) rs1800775 in *CETP* gene was determined by PCR and sequencing [primers 5'-AATGCCACAGACATTCCCCC-3' (forward), 5'-C GACCTTTCCCTTGCTCTGA-3' (reverse)] while *CETP* rs708272 (Taq1B) and *LPL* rs328 SNPs were analyzed by real-time PCR using TaqMan genotyping assay (Applied Biosystems, USA).\

Study definitions: For this study, hypertriglyceridaemia was defined as fasting TG >150 mg/dl and hypercholesterolaemia as fasting cholesterol (TC) >200 mg/dl or LDL-C >130 mg/dl. HDL-C<40 mg/dl for males and <50 mg/dl for females was defined as low HDL-C levels [12]. Patients were classified as hypertensive or diabetics if they had been previously diagnosed with hypertension or diabetes or if they were on medical treatment for these disorders. A TC/HDL ratio of 4.5 or below for men and 4.0 or below for women was considered acceptable. Body mass index (BMI) of >23 kg/m [2] and waist circumference of >90 cm for men and >80 cm for women were considered as cut-offs for overweight and abdominal obesity, respectively, in this study [26]. After one year of ART, plasma viral load of <400 copies/ml was considered as virological suppression. Viral load between 400 and 1000 copies/ml was taken as blips while viral load >1000 copies/ml after one-year of ART was taken as virological failure.

Statistical analysis: Our previous study showed HDL-C levels below the lower limit of normal in about 25 per cent of HIV-infected Indians while on NNRTI-based ART [23]. Based on this, it was planned to enroll 300 HIV-infected patients after one year of ART, to determine the association between HDL-C levels, gene polymorphisms and other risk factors.

SPSS software version 19.0 (IBM Corp, Armonk, NY, USA) was used to perform the data analysis. The data set was checked for logical inconsistencies and omissions. All unusual values were verified; normal distribution was checked. The outcomes of interest included the lipid parameters: TC, LDL-C, HDL-C, TG and TC/HDL-C ratio. Summary statistics is presented as proportions for categorical variables and as mean with standard deviation (SD) for continuous variables. A univariate regression followed by binary logistic regression by stepwise method was constructed to look for factors independently associated with abnormal lipid profile. Adjusted odds ratio (aOR) with its 95 per cent confidence intervals (CIs) was obtained. Candidate SNPs were evaluated in a logistic regression model and mean lipid levels compared between the different allele groups using Tukey analysis of variance at 5 per cent level. Pearson's Chi-square statistics was used to compare the proportions of patients with abnormal lipid values.

Results:

During the study period, 355 HIV-infected adults on NVP-based first-line ART for the past 12-15 months were screened for participation. Of them, 300 patients consented to participate in the study. Their mean age was 38.6±8.7 yr (range: 20-60 yr), mean CD4 cell count was 449±210 cell/µl and median duration of ART was 13.5 months (12-15 months); 26 per cent of the study participants were smokers; 53 per cent (159) were females [Table 1]. Eighty four per cent (252) had zidovudine, 8 per cent stavudine and another 8 per cent tenofovir as one of the nucleoside reverse transcriptase inhibitors in the regimen, along with lamivudine and NVP. The current National ART programme in India [27] considers an optimum ART adherence level of ≥95 per cent. After one year of ART, overall adherence (based on the Likert scale of self-rating adherence) of >95 per cent was found in 72 per cent (n=216) of study participants. Another 22 per cent (n=65) were 80-95 per cent adherent to drugs. Virological suppression of <400 copies/ml was present in 89 per cent (n=268) of the patients. Three patients had viral load between 400 and 1000 copies/ml while 29 had viral load >1000 copies/ml after one year of ART.

Characteristics	Male (n=141)	Female (n=159)	Total (n=300)
Age (yr)	40.5±8.7	36.9±8.4***	38.6±8.7
Weight (kg)††	63.0±12.9	53.0±11.1***	57.7±3.0
BMI (kg/m²)	22.9±4.3	23.1±4.8	23.0±4.6
Mid-arm circumference (cm)	28.1±3.4	26.8±4.0**	27.4±3.8
Waist circumference (cm)	83.4±14.5	76.9±12.2***	79.9±13.7
Hip circumference (cm)	86.9±13.9	90.3±12.9*	88.7±13.5
CD4 cell count (cells/µl)	411±200	484±215**	449±210
TC (mg/dl)	184.4±46.6	193.1±44.4	189.0±45.6
LDL-C (mg/dl)††	109.1±32.1	113.3±39.7	111.3±36.3
HDL-C (mg/dl)	48.0±12.4	52.6±13.5**	50.5±13.2
TG (mg/dl)	147.1±97.0	134.6±96.6	140.5±96.9

††Significant difference in variation between groups (*F*-test) at 1% level, *P* *<0.05, **<0.01, ***<0.001, compared to male (independent *t* test). SD, standard deviation; HDL-C, high-density lipoprotein cholesterol; LDL-C, low-density lipoprotein cholesterol; BMI, body mass index; TC, total cholesterol; TG, triglycerides

Table 1: Demographic and clinical characteristics of the study participants on antiretroviral therapy (n=300)

Lipid profile of participants: The mean serum TC was 189±45.6 mg/dl with hypercholesterolaemia in 116 (39%) patients [Figure 1]. Thirty per cent of them had LDL-C of >150 mg/dl and the mean LDL-C was 111.3±36.3 mg/dl. Hypertriglyceridaemia was seen in 93 patients (31%) with mean TG level of 240.3±118.9 mg/dl. Forty one of 141 males (29%) had HDL-C <40 mg/dl while 75 of 159 females (47%) had HDL-C <50 mg/dl; 32 per cent of males and 37 per cent of females had TC/HDL-C ratio greater than the reference value of 4.5 and 4.0, respectively.

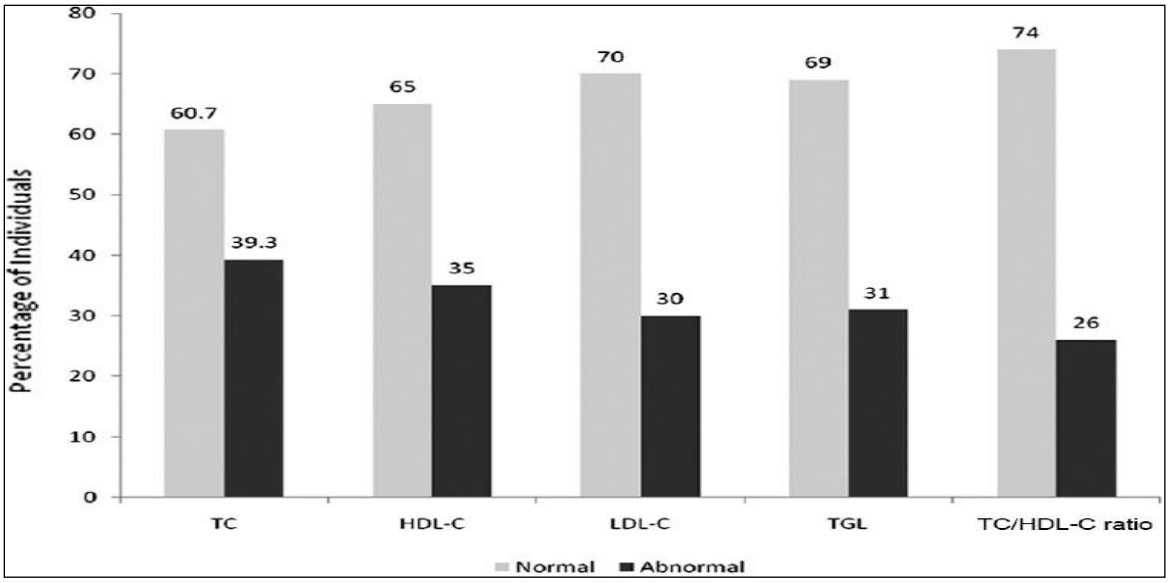

Figure 1: Prevalence of dyslipidaemia in HIV-infected patients on antiretroviral therapy. Abnormal cholesterol=Fasting cholesterol 200 mg/dl; Abnormal triglycerides (TG)=Fasting triglycerides >150 mg/dl. Abnormal high-density lipoprotein-cholesterol (HDL-C)= <40 mg/dl for male, <50 mg/dl for females; Abnormal Low-density lipoprotein-cholesterol (LDL-C) = >130 mg/dl and Abnormal total cholesterol (TC): HDL-C ratio = >4.5.

Factors associated with poor lipid profiles: In univariate analysis, weight >55 kg (OR=1.96, 95% CI: 1.23-3.14, P=0.005), waist circumference of >75 cm (OR=2.20, 95% CI: 1.32-3.66, P=0.002) and hip circumference >80 cm (OR=2.28, 95% CI: 1.16-4.47, P=0.017) and a detectable viral load were associated with TC level above the upper limit of normal [Table 2]. Similarly, weight >55 kg (OR=2.08, 95% CI: 1.26-3.41, P=0.004), mid-arm circumference >25 cm (OR=1.91, 95% CI: 1.09-3.35, P=0.025), waist circumference >75 cm (OR=3.21, 95% CI: 1.79-5.74, P=0.001) and waist hip ratio >0.9 were associated with higher TG levels. BMI >23 kg/m [2] appeared to be associated with a poorer lipid profile in terms of high TC, LDL-C, TG and higher TC/HDL-C ratio [Table 2]. Detectable viral load >400 copies/ml (OR=3.07, 95% CI: 1.45-6.52, P=0.002) while on treatment was significantly associated with higher odds of having abnormal HDL-C at end of one-year of ART. Alcohol consumption, higher BMI and waist circumference >75 cm were also associated with abnormal HDL-C after a year of ART though these did not reach significance. Men had a lower risk of having low HDL-C as compared to women in the similar age (OR=0.45, 95% CI 0.28-0.73, P=0.001) [Table 2].

Considering gender, age, body weight, BMI, smoking status, alcohol use, waist and hip circumferences, CD4 cell count and viral load, using binary logistic regression by stepwise method, only BMI >23 kg/m [2] had an independent and positive association with all abnormal serum lipid levels - TC >200 mg/dl [aOR (adjusted OR)=2.84, 95% CI: 1.76-4.60, *P*<0.001); LDL-C >130 mg/dl (aOR=1.83, 95% CI: 1.10-3.01, *P*=0.02], TGL >130 mg/dl (aOR=2.42, 95% CI: 1.37-4.28, *P*=0.002) and abnormal HDL-C (aOR=1.70, 95% CI: 1.02-2.84, *P*=0.04). High waist circumference had a positive association with TGL levels alone (aOR=2.13, 95% CI: 1.11-4.07, *P*<0.01), while detectable viral load was negatively associated with serum HDL-C levels (aOR=3.39, 95% CI: 1.53-7.52, *P*=0.003). Male gender was protective against low HDL-C in our study group (aOR 0.46, 95% CI: 0.28-0.78, *P*=0.003) (data not shown).

Variables	OR (95% CI)				
	TC (>200 mg/dl)	LDL-C (>130 mg/dl)	HDL-C (<40 mg/dl)	TG (>150 mg/dl)	TC/HDL-C (ratio >4.5)
Gender (male)	0.78 (0.49-1.24)	0.67 (0.40-1.10)	0.45 (0.28-0.73)	1.08 (0.66-1.77)	1.79 (1.06-3.02)
P	0.291	0.112	0.001	0.750	0.028
Age (>40 yr)	1.56 (0.97-2.52)	1.15 (0.69-1.91)	0.47 (0.28-0.79)	1.48 (0.89-2.44)	1.21 (0.72-2.05)
P	0.066	0.585	0.004	0.125	0.477
Smoking (yes)	1.06 (0.53-2.14)	0.72 (0.33-1.60)	0.32 (0.13-0.80)	0.93 (0.44-1.99)	1.24 (0.58-2.64)
P	0.872	0.423	0.011	0.858	0.581
Alcohol intake (yes)	1.09 (0.53-2.25)	0.69 (0.30-1.59)	1.17 (0.56-2.45)	1.44 (0.69-3.02)	1.65 (0.78-3.52)
P	0.815	0.384	0.674	0.335	0.193
Weight (>55 kg)	1.96 (1.23-3.14)	1.29 (0.79-2.12)	0.94 (0.58-1.59)	2.08 (1.26-3.42)	2.43 (1.43-4.14)
P	0.005	0.313	0.808	0.004	0.001
BMI (>23 kg/m²)	2.89 (1.79-4.66)	1.86 (1.13-3.07)	1.31 (0.81-2.11)	3.24 (1.94-5.42)	2.22 (1.31-3.76)
P	0.001	0.015	0.259	0.001	0.003
Mid-arm circumference (>25 cm)	1.52 (0.91-2.54)	1.12 (0.65-1.91)	0.95 (0.57-1.58)	1.91 (1.09-3.35)	1.77 (0.98-3.21)
P	0.107	0.685	0.845	0.025	0.060
Waist circumference (>75 cm)	2.20 (1.32-3.66)	1.47 (0.86-2.49)	1.05 (0.64-1.72)	3.21 (1.79-5.74)	3.03 (1.62-5.65)
P	0.002	0.158	0.840	0.001	0.001
Hip circumference (>80 cm)	2.28 (1.16-4.47)	1.58 (0.79-3.17)	0.87 (0.47-1.60)	1.67 (0.83-3.34)	1.89 (0.88-4.09)
P	0.017	0.200	0.645	0.150	0.103
Waist:hip ratio (>0.9)	1.37 (0.85-2.18)	1.15 (0.70-1.89)	0.58 (0.36-0.95)	2.28 (1.39-3.75)	2.37 (1.40-4.02)
P	0.193	0.575	0.028	0.001	0.001
CD4 (>450 cells/µl)	0.72 (0.45-1.14)	0.78 (0.47-1.27)	1.19 (0.74-1.92)	0.85 (0.52-1.39)	1.10 (0.66-1.85)
P	0.160	0.313	0.467	0.515	0.712
Viral load (>400 copies/ml)	0.40 (0.17-0.95)	0.51 (0.20-1.27)	3.07 (1.45-6.52)	1.01 (0.46-2.24)	1.34 (0.60-2.97)
P	0.037	0.148	0.002	0.974	0.475

TC, total cholesterol; LDL-C, low-density lipoprotein cholesterol; HDL-C, high-density lipoprotein cholesterol; TG, triglycerides; OR, odds ratio; CI, confidence interval; BMI, body mass index

Table 2: Association of lipid profile and various factors in our study participants (n=300)

Framingham's cardiovascular risk score: The 10-yr risk of coronary heart disease was estimated using the Framingham's point score and 97 per cent (n=289) of patients had a risk of <10 per cent while 3 per cent of patients had **11**-20 per cent risk of developing CVD at the end of one-year of ART.

Effect of single nucleotide polymorphisms (SNP) in various genes

Apo lipoprotein C3 (*APOC3*) gene polymorphisms: Homozygous carriers of C allele in rs2854116 and rs5128 displayed a trend towards higher lipid levels after 12 months of ART, when compared to heterozygous or non-carriers; in fact, the non-carriers of this allele had the lowest lipid levels among the three groups [Table 3]A. However, this difference was not significant. Further, among individuals with abnormal lipid profiles, there was no significant difference in the allelic frequencies of *APOC3* related rs2854116, rs2854117 and rs5128 polymorphism [Table 3]A.

Cholesteryl ester transfer protein (CETP)-related polymorphisms: Homozygous carriers of A allele in rs708272 of *CETP* showed a trend towards a higher HDL-C as compared with subjects with GG genotype in both genders [Table 3]B. However, this difference was not significant.

Lipoprotein lipase (LPL)-related polymorphisms: Proportion of various polymorphism of *LPL* gene in the low-, middle- and upper-decile HDL-C levels did not show any significance in any particular group though a trend was seen in patients with homozygous carriers of C allele toward a low HDL-C [Table 3]C.

Lipid profile (mg/dl)	μ±σ (n)					
	TG (abnormal)	TC (abnormal)	LDL-C (abnormal)	Male HDL-C (abnormal)	Female HDL-C (abnormal)	BMI (abnormal)
APOC3 rs2854116						
CC (n=92)	147.4±109.4 (33)	192.2±44.3 (38)	111.8±37.7 (28)	49.1±12.8 (9)	52.9±13.1 (21)	23.1±4.7 (41)
TC (n=133)	134.3±79.4 (37)	186.5±46.0 (51)	110.9±35.2 (40)	47.8±11.3 (17)	53.7±13.0 (26)	22.9±4.1 (66)
TT (n=70)	146.4±111.4 (23)	189.8±45.7 (27)	111.2±35.4 (21)	46.3±15.2 (10)	50.9±14.8 (22)	23.2±5.2 (33)
P value	0.539 (0.426)	0.643 (0.895)	0.984 (0.998)	0.674 (0.196)	0.575 (0.652)	0.899 (0.775)
APOC3 rs2854117						
CC (n=83)	142.7±103.3 (26)	190.0±45.9 (34)	112.3±36.4 (27)	45.7±14.4 (12)	51.0±14.0 (25)	23.4±5.1 (42)
CT (n=130)	133.0±80.9 (36)	184.7±45.8 (47)	109.6±34.4 (37)	48.0±11.2 (16)	53.3±13.3 (25)	22.6±4.2 (60)
TT (n=82)	152.7±113.9 (31)	194.9±43.7 (35)	112.9±38.1 (25)	49.3±13.2 (8)	53.7±13.4 (19)	23.3±4.6 (38)
P value	0.353 (0.304)	0.270 (0.598)	0.767 (0.817)	0.497 (0.110)	0.551 (0.846)	0.385 (0.795)
APOC3 rs5128						
CC (n=44)	144.7±110.4 (17)	192.6±41.1 (19)	112.2±41.8 (14)	52.0±10.1 (2)	51.3±12.6 (13)	23.1±5.5 (19)
GC (n=117)	140.4±95.4 (35)	186.9±49.9 (45)	110.0±36.0 (34)	47.9±11.9 (15)	54.2±13.5 (20)	23.1±4.0 (59)
GG (n=133)	141.3±95.5 (41)	190.0±42.6 (52)	112.2±34.2 (41)	46.5±13.8 (19)	52.2±14.0 (35)	23.0±4.7 (62)
P value	0.970 (0.549)	0.744 (0.856)	0.878 (0.927)	0.293 (0.071)	0.625 (0.826)	0.987 (0.680)

Values are mean±SD of the lipid levels while the number in parentheses shows the proportion of individuals with abnormal lipid profiles. Tukey analysis of variance was used to compare the means at 5% level. *P* values in parentheses represent significance of proportion. SD, standard deviation; APOC3, apolipoprotein C3; LDL-C, low-density lipoprotein cholesterol; HDL-C, high-density lipoprotein cholesterol; TGL, triglycerides; BMI, body mass index

Table 3A: Lipid parameters between the genotype variants of apolipoprotein C3 related polymorphisms among 295 study participants

Male						Female					
rs1800775			rs708272			rs1800775			rs708272		
Allele	n	μ±σ	Allele	n	μ±σ	Allele	n	μ±σ	Allele	n	μ±σ
AA	67	47.2±11.8	AA	37	49.1±13.0	AA	60	53.7±14.8	AA	43	56.0±16.3
AC	67	48.7±13.5	AG	69	48.3±12.8	AG	59	52.2±12.4	AG	68	51.0±11.0
CC	24	48.0±11.8	GG	31	46.3±11.4	GG	19	50.9±13.3	GG	47	51.9±13.9
P value		0.806			0.651			0.649			0.15

Table 3B: Association between cholesteryl ester transfer protein (CETP) polymorphism and serum high-density lipoprotein cholesterol (HDL-C) levels

Cholesterol	*LPL* gene			Total, n (%)
	CC, n (%)	CG, n (%)	GG, n (%)	
Low HDL	83 (36.1)	28 (46.7)	2 (66.7)	113 (38.6)
Median HDL	96 (41.7)	26 (43.3)	1 (33.3)	123 (42.0)
High HDL	51 (22.2)	6 (10.0)	0 (0.0)	57 (19.5)
Total	230 (100)	60 (100)	3 (100)	293 (00)

For men - Low HDL, HDL <40 mg/dl; Median HDL, HDL 41-60 mg/dl; High HDL, >60 mg/dl or women - Low HDL, HDL<50 mg/dl; Median HDL, HDL 51-60 mg/dl; High HDL, >60 mg/dl. By *LPL* gene - CC versus CG - 0.082; CC versus GG - 0.478; CG versus GG - 0.738. By HDL, Normal versus high - 0.169; low versus normal - 0.628; low versus high - 0.048; over all significance - 0.178

Table 3C: Association between lipoprotein lipase (LPL) polymorphism and serum high-density lipoprotein (HDL) cholesterol levels

Only the heterozygous carriers of C allele in *APOC3* rs2854117 (aOR1.45, 95% CI 0.99-3.09, *P*= 0.05) seemed to have a protective effect against abnormal HDL-C. None of the other SNPs of *APOC3*, *CETP* or *LPL* genes had any significant association with abnormal HDL-C [Table 4]. In our study, 29 patients had detectable viral load and their drug adherence was <80 per cent. The analysis was repeated after excluding these 29 patients with virological failure, but no significant association was found with either *APOC3*, *CETP* or *LPL* gene polymorphisms or low HDL-C.

Gene and SNP	HDL		OR (95% CI)	*P* value
	Normal	Abnormal		
APOC3 rs2854116 (n=295)				
CC	62	30	1.00	
TC	90	43	1.01 (0.57-1.79)	0.920
TT	38	32	0.57 (0.30-1.09)	0.089
TC + TT	128	75	0.83 (0.49-1.39)	0.471
APOC3 rs2854117 (n=295)				
CC	46	37	1.00	
CT	89	41	1.45 (0.99-3.09)	0.054
TT	55	27	1.64 (0.87-3.08)	0.124
CT + TT	144	68	1.70 (1.01-2.87)	0.044
APOC3 rs5128 (n=294)				
CC	29	15	1.00	
GC	82	35	1.21 (0.58-2.54)	0.610
GG	79	54	0.76 (0.37-1.54)	0.442
GC + GG	161	89	0.94 (0.48-1.84)	0.841
CETP rs1800775 (n=296)				
AA	84	43	1.00	
AC	80	46	0.89 (0.53-1.49)	0.663
CC	27	16	0.864 (0.42-1.77)	0.689
AC + CC	107	62	0.883 (0.55-1.43)	0.617
CETP rs708272 (n=295)				
AA	56	24	1.00	
GA	87	50	0.75 (0.41-1.35)	0.330
GG	47	31	0.65 (0.34-1.26)	0.199
GA + GG	134	81	0.71 (0.41-1.23)	0.221

CETP, cholesteryl ester transfer protein; APOC3, apolipoprotein C3; HDL, high-density lipoprotein; CI, confidence interval; OR, odds ratio; SNP, single nucleotide polymorphism

Table 4: Association of genetic variants in genes associated with high-density lipoprotein (HDL)-cholesterol

Our study revealed low HDL-C levels in 39 per cent HIV-infected patients receiving NVP-based first-line ART. Higher BMI and unsuppressed viral load were significantly associated with low levels of HDL-C after 12 months of NVP-based first-line ART. Hypercholesterolaemia (39%), raised levels of LDL-C (30%) and hypertriglyceridaemia (31%) were the other forms of dyslipidaemia seen. Though high, occurrence of HDL-C levels below the reference value after one year of ART was much lower to the reported rate of 50.8 per cent in patients using HAART for at least six months in Ethiopia [3]. However, this was higher than that observed in a clinical trial cohort from the same setting as well as other studies from developing world [17],[22],[23],[28]. Our patients were predominantly from a lower socio-economic background and from semi-urban setting and did not have high rates of obesity.

Multiple factors contribute to dyslipidaemia in HIV-infected individuals including HIV virus itself, chronic inflammation, individual genetic characteristics and

ART-induced metabolic changes [29]. Higher BMI and waist circumference were associated with hypercholesterolaemia, hypertriglyceridaemia and low HDL-C levels emphasizing the potential role of lifestyle (diet and exercise) in this population. Lifestyle changes may be beneficial and can be recommended for patients on ART. Furthermore, suppressed viral load was a protective factor against low HDL-C levels. This negative association between viral load and HDL-C levels observed in our study has also been noticed in other studies, even in ART-naïve individuals, indicating the role of HIV infection *per se* causing low HDL-C levels [22],[30],[31]. Hence, detectable viral load along with low HDL-C, in HIV-infected individual, after one year of stable ART, should raise the suspicion of non-adherence to ART even though the self-reporting indicates >95 per cent adherence.

A small number of patients in our study (n=8) had a 11-20 per cent 10-yr risk of developing coronary heart disease and all of them had low levels of HDL-C. Although this was a small number, all efforts should be made to normalize their HDL-C levels as for every one per cent increase in HDL-C, there is a three per cent reduction in death or myocardial infarction [10]. A study from north India has shown a greater prevalence of polymorphism in *APOC3* promoter region (C-482T and T-455C) among non-HIV subjects with metabolic syndrome and dyslipidaemia as compared to controls (frequency of 71 and 82% vs. 43 and 54%, P=0.0001)[13]. However, we were not able to identify significant associations between the *APOC3*-related polymorphism and lipid parameters in our study. Homozygous carriers of C allele in rs5128 showed a trend towards more individuals with normal HDL-C levels when compared to heterozygous or non-carriers. Similar results have also been reported by a Spanish group where A allelic variant of the rs10892151 polymorphism was not found to be associated with serum *APOC3* concentration but predisposes HIV-infected patients to less favorable lipid profile [32]. Considering the crucial role of *CETP* and *LPL* genes in lipid metabolism, the association of SNPs of these genes with low HDL-C levels was examined but no significant association between low HDL-C and gene polymorphisms was observed. A few other studies have shown an association between *CETP* and lipid metabolism [16],[33],[34]. The reports from India are varied as each has looked at different *CETP* polymorphisms and HDL-C metabolism [35],[36]. In the study by Dixit *et al*[36], lipid profile analysis did not show any significant difference in distribution among genotypes of *CETP* polymorphism among patients and controls. These contradictory results in different populations indicate that various mutation/polymorphisms of *APOC3* and *CETP* are involved with HDL-C metabolism and more research is needed in this field.

A cross-sectional study design and a lack of control group were major limitations in this study. As we did not have baseline data on these individuals or a control group with similar baseline characters but without these changes at one year, we could not examine changes induced by ART use and what the baseline prevalence of dyslipidaemia was. No data were collected on dietary and other lifestyle factors that might have an impact on lipid profiles. The sample size was adequate for the lipid analysis, with a power >90 per cent, but may have been small to detect differences in gene polymorphisms.

In conclusion, our results indicated that a high proportion of HIV-infected patients had a low HDL-C level after one year of NVP-based ART. Association was found between NVP-based ART and high-risk lipid profiles for atherosclerosis and CVD raising concerns about their long-term morbidity. Targeted interventions such as periodic monitoring of lipid levels, dietary modification, physical exercise and good virological control need be recommended as part of the National ART programmes.

Acknowledgment

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India needs state specific health policies: Soumya Swaminathan

Emphasizing on how India was facing a dual challenge because of the rising number of lifestyle diseases accounting for almost 62 percent coexisting along with the infectious diseases, Swaminathan pointed out that there was an urgent need for the health policymakers to take this report as a starting point and customize policies varying from state to state. She also reiterated that the only way to get the health quotient better was to increase the spending every year. In an exclusive interview to Rajya Sabha TV, DG ICMR stressed that

State level disease burden report was not only meant for the health sector but also to areas like urban planning which need to take into account the findings of the report before they make policies.

Q: How significant is India's state-level disease burden report?

A: This is something we thought of two years ago. These are statistics which are state specific; data is heterogeneous, varying from state to state in terms of health performance. Every state would now know what would be their health problems. This is for the first time that we have come out with such an exhaustive report. We have used latest computational techniques

Q: Lack of data has always been a problem in the health sector, what kind of a challenge is it now for the policymakers?

A: We do not have an accurate civil registration process specially birth and death registration. Latest analysis shows we are at the bottom when it comes to civil registration. Our planners need to plan on this line to get the birth and death registration. That's the top most priority. . We have had various surveys like family health survey, district health survey. All these surveys have been used. Previous health surveys have looked at parameters which were eliminated. For the first time this report has talked about risk factors. It uses a metrics which can be compared easily what you call an epidemiological transition. India is facing a transition where we have moved towards non communicable diseases. Kerala, Tamil Nadu affluent states have more number of deaths due to non communicable diseases.

Q: Does India face a dual challenge or a double whammy? 62 % deaths due to noncommunicable diseases and you also have infectious diseases

A: This report is a wakeup call. it's not only a double burden but a triple burden as well. Data on injuries is so exhaustive has come for the first time. We have the burden of communicable diseases in the empowered action group states like MP, UP, Rajasthan but we have moved towards noncommunicable diseases.

Q: Why hasn't India not been able to respond to these changes?

A: We need to remember that as populations live longer life span has increased by 10 years . As you live longer you will get more non communicable diseases. That's expected. What we have to focus on premature deaths. The biggest risk factor is tuberculosis due to mal nutrition. Tb is linked directly to malnutrition and low immunity. Large part of our populations is suffering with TB. People don't take treatment properly. TB IS transmitted by air. We will be able to eliminate it by next ten years.

Q: What about urban planning, does this report send out a signal to the urban planners?

A: For non communicable diseases every sector of the govt and civil society has to think. We need open spaces, park etc. People living near green spaces are much healthier. There is a study on this. We need to reduce the amount of sugar and salt in our food. Food processing industry needs to look at ways and, mean to reduce salt and sugar. 80 percent Indians don't eat enough fruits and vegetables. Healthy diet and exercise is important. The other risk factor is outdoor pollution.

Q: How will policy makers think about health insurance schemes?

A: We have to think at several levels. Think about preventive health care. We have focused on cure. Our primary health care centers need to become hubs of primary and preventive care. They can teach people about keeping oneself healthy. Burden of diseases like cancer, cardio vascular diseases will increase in the coming years. Expense on these diseases is a financial burden. Now states have started thinking about providing services to people. Some states have already set up centre treating heart attacks. Dialysis at centers is another boost to government programs done through private Public partnership.

Q: Does this report send out a signal that every state will need separate health policy as data varies from states to states?

A: Yes policy can't be uniform. It has to happen like that otherwise the entire exercise will be pointless. Universal health assurance program has been developed to cover the below the poverty line people gradually it will incorporate others

Q: India spends 2.5 percent of the GDP on health. How will you expand the services, bring out the affordability when you do not have money.

A: We need resources that are the only way out. We need a progressive increase in health spending. Govt is spending 1.4 percent. Most of the expenditure is coming from out of pocket expenditure. With GST states will have more resources. Both states and centre will have to work together. Focus has to be state specific. Each state has to make informed decisions on spending resources.

Q: What about health infrastructure both physical and human?

A: Both will need additional allocations. More important is the human resources. At the sub centers which cater to people have an Ayush practitioner? He is able to treat the common diseases then you have a referral center. But we need more trained along with free drugs. For chronic diseases, we need free drugs. We need good counselors. That's the model we don't have and we need to develop that large part of our country quacks is providing the first point of care. Govt has to focus on high-quality doctors. People will then go to the primary health centers and sub-centers. There have to be enough drugs. We have to ensure quality care. Until that happens quacks are available at a minutes' notice they misuse antibiotics.

Q: Political parties never take up health as a natural narrative, be it the ruling parties or opposition parties health is never an issue?

A: Things are changing but we need to do more. Health literacy is an issue. ICMR is there to bring out facts and be very science-based. The first step is to accept the problem then only we can address the problem. Diseases burden report is not to name and shame; it's a reality check on states health. There are positives also to look forward. But we need to look at the road ahead.

Rajya Sabha TV: November 21, 2017

ICMR to launch dissemination programmes across country to create awareness on national ethical guidelines

In order to create awareness on the National Ethical Guidelines, released recently by the Indian Council of Medical Research (ICMR), amongst all stakeholders such as researchers, ethics committee member, students, nurses as well as faculty involved in biomedical and health research, a series of dissemination programs are being organized by the ICMR across the country.

The first such dissemination program will be held on November 16 at JLN Auditorium, AIIMS, Ansari Nagar, New Delhi. The second dissemination program will be held on November 30 at AMCMET Medical College, Ahmedabad. The third programme will be held on December 14 at Bhargava Auditorium, PGIMER, Chandigarh. The fourth awareness program will be on December 21 at Visakhapatnam. The exact venue will be announced soon. The fifth dissemination program is scheduled to be held in January 2018 at Chennai and the date and venue will be announced soon, according to ICMR officials. Earlier on October 12, 2017, the ICMR had released the revised the ICMR ethical guidelines "National Ethical Guidelines for Biomedical and Health Research Involving Human Participants, 2017" and "National Ethical Guidelines for Biomedical Research Involving Children" which are aimed at protecting and safeguarding the interests of individuals, communities and society as a whole.

These ethical guidelines are expected to address the ethical challenges involved in a variety of biomedical and health research areas and will be a useful document for the researchers, ethics committees, institution and sponsors engaged in the conduct of biomedical and health research involving human participants across the country. These guidelines are applicable to all biomedical, social and behavioural science research for health conducted in India involving human participants, their biological material and data. The purpose of such research should be directed towards enhancing knowledge about the human condition while maintaining sensitivity to the Indian cultural, social and natural environment; conducted under conditions such that no person or persons become mere means for the betterment of others and that human beings who are participating in any biomedical and/or health research or scientific experimentation are dealt with in a manner conducive to and consistent with their dignity and well-being, under conditions of professional fair treatment and transparency; and subjected to a regime of evaluation

at all stages of the research, such as design, conduct and reporting of the results thereof.

The new guidelines have many new sections added up and many changes incorporated in the existing sections. There are now a total of 12 sections including Responsible Conduct of Research, Informed Consent Process, Vulnerability, Public Health Research, Social and Behavioural Sciences Research for Health, Biological materials, Biobanking and Datasets and Research during Humanitarian Emergencies and Disasters. Many new issues have been added up as subsections e.g. sexual minorities (LGBT), multicentric studies, research using datasets etc. The section on ethics review process has been elaborated to help the many ethics committees who have doubt about the various procedures to be followed.

Pharmabiz.com: November 16, 2017

ICMR News

M Venkaiah Naidu releases the findings of 'India State Level Disease Burden' report

The releaseof findings of 'India State Level Disease Burden' report, a joint initiative between the Indian Council of Medical Research (ICMR), Public Health Foundation of India (PHFI), and Institute for Health Metrics and Evaluation (IHME) in collaboration with the Ministry of Health and Family Welfare. The article adds that the report aims to inform health planning to reduce health inequalities amongst states in India. The estimates are based on analysis of all identifiable epidemiological data from India over quarter of a century.

Biospectrum | November 15, 2017

Biodegradable, reusable sanitary pads undergo tests: The Indian Council of Medical Research

National Institute for Research in Reproductive Health (NIRRH), Mumbai, will be testing a reusable pad called 'Saafkins' that can be used by women for at least a year and another 100% biodegradable pad, especially for the rural population. Dr. Smita Mahale, Director, NIRRH, is quoted informing that ICMR is identifying a target population to use the pads and shall check if stains can be easily removed and if the pads are bacterio-static.

Indian Express | November 19, 2017

ICMR signs MoU with FICCI for commercialization of technologies for providing affordable healthcare solutions at the last mile

Federation of Indian Chambers of Commerce and Industry (FICCI) signed an MoU with ICMR for Health Technology Accelerated Commercialization (H:TAC) Program that shall be implemented in partnership with the IC2 Institute and University of Texas, Austin. The article adds that H:TAC shall build capacities for ICMR scientists by providing them training on technology commercialization strategies and exposing them to global best practices on innovation and commercialization.

Business Standard | November 20, 2017

Shri J P Nadda inaugurates 1st World Conference on Access to Medical Products and International Laws for Trade and Health India is deeply committed nationally and globally to achieving all public health goals: J P Nadda

Speaking at the inauguration of the first World Conference on Access to Medical Products and International Laws for Trade and Health, the article quotes Dr. Soumya Swaminathan, Director General, ICMR, highlighting the use of alternative models for affordable medicines and devices to reduce cost of production and delivery. She also raised issues related to clear predictable regulatory pathways; more investment in R&D and publicly funded R&D; innovative healthcare service delivery models; antibiotic stewardship among others.

Business Standard | November 21, 2017

UC researchers to test the genetic control of mosquitoes in India

Researchers at the University of California (UC) have been granted $70 million (Rs. 460 crore) from India's Tata Trusts to employ 'Gene Drive' to create a strain that resists the parasite that causes malaria. This is the largest foreign investment ever received by UC San Diego and 50% more than the annual budget (Rs. 300 crore) of National Vector Borne Disease Control Program (NVBDCP) - India's nodal agency for the control of all vector-borne diseases. The article quotes R.S. Sharma and A.C. Dhariwal, two former NVBDCP directors who stated that everybody is pushing their agenda without knowing the biology of vector diseases in the field. Mr. Dhariwal was quoted questioning why the Tata Trust is pumping money into a California University and not into the ICMR.

Biospectrum | November 21, 2017

Global study on causes of under-five mortality in India soon

The article informs of a study which will be jointly conducted by Centers for Disease Control and Prevention, Atlanta and National Institute of Pathology, ICMR that aims to understand the causes of death of children under the age of five which has been initiated in "South Africa, Mozambique and Mali". Dr. Soumya Swaminathan, Director General, ICMR, is quoted stating that the pilot of a study titled "Child Health and Mortality Prevention Surveillance (CHAMPS)", funded by the Bill & Melinda Gates Foundation, will commence in a "month or two" in India.

New Indian Express | November 22, 2017

The final lap towards elimination of Lymphatic Filariasis

The article is an opinion editorial by Dr. N.K. Ganguly, Former Director General, ICMR, emphasizing on a breakthrough in treatment and control of Lymphatic Filariasis (LF) by the World Health Organization (WHO). Mentioning that ICMR estimates show 31 million people in India are infected with LF, the article reports that although the new triple drug therapy holds out a promising opportunity to shorten the path to elimination of LF in India , there is much more that needs to be done. Dr. Ganguly states that ICMR is coordinating efficacy trials on the triple drug therapy and will be coming out with its recommendations. To accelerate the last leg of LF elimination in India, Dr. Ganguly has urged the National Vector Borne Disease Control Program, Vector Control Research Centre and ICMR to make it a reality.

The Hindu Business Line | November 24, 2017

Death Analysis - ICMR to find out what kills Indians

The article quotes Dr. Sanjay Mehendale, Additional Deputy Director General, stating that ICMR would begin the pilot program of the death analysis study in Tamil Nadu, Assam and Odisha from January 2018.
ICMR shall employ the process of verbal autopsy in which a trained health worker would visit every house with a set of questions, seeking answers from the relatives. Dr. Soumya Swaminathan, Director General, ICMR, mentioned that 10-15 outreach workers would be required to cover the entire district and that the workers will have to visit the houses within a month of the death. The article adds that the same method was adopted for the Million Death Study – one of the world's largest mortality studies in the world conducted by Indian and Canadian public health experts in collaboration with the Registrar General of India.

Deccan Herald | November 25, 2017

Soumya Swaminathan to take charge as WHO Deputy DG in Dec

Dr. Soumya Swaminathan, Director General, ICMR, shall be assuming the charge of Deputy Director General for Programs (DDP), World Health Organization (WHO), Geneva, in December 2017.

Press Trust of India | November 26, 2017

Research project to study causes for KFD outbreak

The National Institute of Traditional Medicine, Belagavi, Department of Health and Family Welfare, Kerala and the United Kingdom based Centre for Ecology and Hydrology shall be jointly conducting research on the possible causes for the outbreak of Kyasanur Forest Disease (KFD), also known as monkey fever, and on measures to tackle it. The study will focus on evolution and behavior of the virus that causes KFD and Haemaphysalis Spinigera variety of tick that acts as its vector and the possibilities of improving the efficacy of the vaccine administered for the disease.

The Hindu | November 26, 2017

'Anganwadis would be key to health databases'

The article informs of Mr. Rajesh Kumar, Joint Secretary, Ministry of Women and Child Development, stating that 14 lakh anganwadi centres in India would have received IT-enabled devices like smartphones and tablets by 2020 to drive health databases and provide insights into childhood nutrition. Addressing the inaugural session of the International Conference on 'Nutrition Before, Beyond and During the First 1,000 Days of Life' at National Institute of Nutrition (NIN), Hyderabad he added that efforts are being undertaken to do away with manual registries and gaps in data. The article adds that Dr. T. Longvah, Director of NIN, Dr. Anura V. Krupad of St. Johns Medical College, Bengaluru and Dr. G.S Toteja, Head for Nutrition at Indian Council of Medical Research, were present at the event.

The Hindu | November 26, 2017

In the throes of a cancer crisis

The article is an opinion editorial authored by Dr. Soumya Swaminathan, Director General, ICMR, highlighting cancer as a leading cause of death and the importance of understanding the scale of the disease to curb it. She informs about cancer registries being set up by ICMR as the National Cancer Registry Program (NCRP) in Bengaluru, in 1982, which now runs as part of National Centre for Disease Informatics and Research (NCDIR). Dr. Swaminathan further states that currently, the ICMR's Cancer Registries cover less than 10% of the Indian population and the absence of registries in several large states restricts better estimates of cancer. She adds that expanding cancer registries across India shall provide region-wise specific data to strategically plan and priorities interventions to triumph over cancer.

Arunachal Times | November 27, 2017

Rs120 cr from Mehta Foundation spurs work on Sickle Cell Centre DPR

ICMR has been taking active interest in the setting up of the Centre for Excellence in Sickle Cell Research and efforts have started towards preparing a detailed project report for the long pending ambitious project. The article adds that Mr. Nitin Gadkari, Union Cabinet Minister, had announced the setting up of the centre and the hospital a few months back and convinced Mehta Foundation, based in USA, to donate Rs. 120 crore for the project.

The Times of India | November 29, 2017

Health Ministry and ICMR launch India Hypertension Management Initiative (IHMI)

Smt. Preeti Sudan, Secretary, Ministry of Health and Family Welfare (MoHFW) and ICMR launched The India Hypertension Management Initiative (IHMI) - a collaborative project of ICMR, MoHFW, State Governments, World Health Organization (WHO), and Resolve to Save Lives initiative of Vital Strategies. The primary goal of IHMI is to reduce morbidity and mortality due to cardiovascular disease (CVD), the leading cause of death in India, by improving the control of high blood pressure, reducing salt consumption and eliminating artificial trans-fats,which are leading risk factors for CVDs among adults in India.

Business Standard | November 29, 2017

Kits developed by ICMR's National Institute of Virology in collaboration with Zydus Cadila

ICMR and Zydus Cadila launched new diagnostic kits to detect neglected infectious diseases in livestock, developed by National Institute of Virology (NIV), Pune. Stating that these diagnostic tests shall help public health services in effective detection and surveillance, as per a press release issued by ICMR, this public-private partnership between ICMR and Zydus Cadila shall open new avenues for more indigenous diagnostics for public health benefits.

The Hindu |November 30, 2017

National AIDS institute to set up lab for diagnosing Rickettsial infections

Reporting on a state-of-the-art laboratory being set up at National AIDS Research Institute (NARI) to diagnose Rickettsial infections, the article quotes Dr. R.R. Gangakhedkar, Director, NARI, stating that there exist challenges in the early diagnosis and management of infections such as the rickettsial infection. Dr. Narendra Rathi, Consultant Pediatrician, Akola, further stated in Indian Pediatrics Journal's recent issue, that once considered a disease affecting rural population, rickettsial infections that are transmitted by

fleas, mice, lice and ticks, are being increasingly reported from urban areas.

The Indian Express | December 1, 2017

India to begin minimally invasive autopsies in cases of child deaths

A pilot project at Safdarjung Hospital, New Delhi, in January 2018, as part of the global CHAMPS— Child Health and Mortality Prevention Surveillance Project, shall examine under-five child deaths in India through minimally invasive autopsies to ascertain the exact cause of death. It adds that ICMR has also tied up with Columbia University to know what triggers encephalitis— swelling in the brain, in children in Gorakhpur.

Hindustan Times | December 2, 2017

Thyroid cancer rate high in South Kerala

Discussions at the 33rd annual review meeting of the National Cancer Registry Program of ICMR held recently at Kochi, Kerala. Dr. Prashant Mathur, Director, National Centre for Disease Informatics and Research (NCDIR), ICMR, stated that the 3 cancer registries at Kerala supported health policy-makers to manage and plan action for disease-control programs. He added that data collected from the registries helps infer the type of cancer, the affected people, the spread of cancer in a region, among others. Dr. Mathur is quoted stating that "Making cancer a notifiable disease is one of the key agendas that will be pushed through the States. Already nine States have made it a notifiable disease. This will provide a Statewide data on the new cases."

The Hindu | December 2, 2017

UNICEF lauds govt's Arogya Lakshmi scheme

UNICEF conducted the "Arogya Lakshmi" scheme study in collaboration with Amaltas, Centre for Economic and Social Studies (CESS) and National Institute of Nutrition (NIN). Reporting that the scheme designed for the benefit of pregnant women and nursing mothers was commended by UNICEF, the article added that the report suggested a dedicated health education session to be conducted for the newly-wed through mass media.

The Hans India | December 8, 2017

Diabetic patients: Kerala tops list of Indian states

Citing an analysis of separate studies done by ICMR and Sree Chitra Tirunal Institute for Medical Sciences and Technology, Thiruvananthapuram, while 19.4% people have diabetes in Kerala, the corresponding figures in Chandigarh and Tamil Nadu is 13.6% and 10% respectively. It further adds that a recent ICMR study conducted in 15 Indian states, with an exception of Kerala, found a mean prevalence of 7.3%.

The Times of India | December 8, 2017

Suicide kills more youths in Tamil Nadu than accidents

Referring to the ICMR study that reveals Tamil Nadu topping the list of states where suicide causes more deaths among all age groups than road accidents, the article highlights experts stating that despite suicides increasing across India, very few resources exist to check them. Dr. Lakshmi Vijayakumar, Editor of WHO's World Suicide Report 2014, is quoted stating that the findings of the ICMR study have prompted the team that drafted the nationwide suicide prevention plan for the central government to conduct a second in-depth investigation into suicides.

The Times of India | December 9, 2017

Lifestyle disease death rate highest in Tamil Nadu

Citing the 'India: Health of the Nation's States' report compiled by ICMR, PHFI and IHME, Tamil Nadu has the highest death rate due to lifestyle diseases such diabetes and kidney disease. The report adds that ischemic heart disease is the biggest killer in Tamil Nadu. J. Radhakrishnan, Health Secretary, is quoted stating that people are being screened for lifestyle disorders, and that polices shall now cover prevention, early diagnosis and treatment of all non-communicable diseases.

The Times of India | December 9, 2017

Sleeping pattern, fastfood culture making children obese: Nutrition experts

National Institute of Nutrition (NIN), hosting an international conference on "Nutrition before, beyond and during first 1000 days of life: Evidence and action". Nutrition experts have warned regarding a change in sleeping habits coupled with fast-food culture and lack of exposure to physical exercise,

increasing the girth of primary school children in Hyderabad. Stating that although obesity is a common problem in high school and college students in Hyderabad, a sedentary lifestyle is now affecting the body mass index (BMI) of the primary school children too.

The Times of India | December 9, 2017

ICMR announces availability of technologies for collaboration

ICMR has announced the availability of several technologies for collaboration which includes diagnostic ELISA for detection of IgM antibodies against dengue virus, Japanese Encephalitis (JE) virus and Chikungunya virus. It adds that Dengue IgM Capture ELISA kit, JE IgM Capture ELISA kit and Chikungunya (CHIK) IgM Capture ELISA kit technology are cost effective and have been developed by National Institute of Virology, Pune.

Pharmabiz.com | December 11, 2017

Heart disease top cause of death in Kerala: Study

The threat posed by seasonal communicable diseases in Kerala over the last few years. However, as per a study conducted by ICMR, PHFI and IHME, on the disease burden trends from 1990 to 2016, Kerala has one of the highest incidences of non-communicable diseases (NCDs) in India. Stating that Goa and Tamil Nadu also have the largest dominance of NCDs and injuries over infectious and associated diseases, the article mentions that stroke and kidney diseases have also shown an increasing trend over the years as the leading cause of death in Kerala.

The Times of India | December 12, 2017

Air pollution raises low birthweight risk

The findings of a study by scientists at Sri Ramachandra University-ICMR Advanced Research Centre in Chennai. It states that for every 10 microgram per cubic metre increase in the concentrations of particulate matter sized 2.5 microns (PM 2.5) lowered birthweight by 4 grams. In the article, the scientists state that their findings underline the need to add maternal exposure to PM 2.5 as a risk factor for low birthweight alongside traditional ones such as maternal nutrition and health.

The Telegraph | December 28, 2017

SEMINARS/ SYMPOSIA/ CONFERENCES/ WORKSHOPS ETC SUPPORTED BY ICMR

S. No.	TITLE	DATE/ DURATION/ PLACE	ORGANISERS
1	2ND Asian Congress of Pediatric Intensive Care	2-5 NOV. 2017 at Chandigarh	PGIMER
2	35th Annual Conference of Indian Society for Medical Statistics	2-4 Nov. 2017 at Lucknow (UP).	Sanjay Gandhi Postgraduate Institute of Medical Sciences
3	Seminar on Suicides Among Medical Professionals,Cocktail of Social Competency, Hormonal Imbalance or Stress	3-4 Nov. 2017 at Mumbai	Hinduja College of Nursing, P D Hinduja Hospital & Medical Research Centre
4	Seminar on Medical Image Analysis with Deep Learning Frameworks	3-4 Nov. 2017 at Pollachi (TN)	P.A.College of Engineering & Technology

5	National Conference on Protein Structure and Dynamics in Health and Agriculture	3-4 Nov. 2017 at New Delhi	Centre for Interdisiciplinary Research in Basic Sciences
6	3RD World Congress on Disaster Management –2017 (3RD WCDM-2017)	6-10 Nov. 2017 at Visakhapatnam (AP)	Disaster Management Initiatives & Convergence Society (DMICS)
7	Seminar on Striving for Excellence Promoting Scientific Writing and Publication Ethics in Nurses	7-8 Nov. 2017 at Guwahati (Assam)	Asian Institute of Nursing Education
8	Swadeshi Science Congress	7-9 Nov. 2017 at Kollam (Kerala)	Swadeshi Science Congress
9	Workshop on Medical Lab Technology: Recent Advances in Lab Diagnostics	7-13 Nov. 2017 at Bilaspur (C.G.).	Bilaspur University
10	Symposium on Managing Fast Changing Indian Clinical Trials Regulations & Challenges in Conducting Oncology Studies	9th Nov. 2017 at Bengaluru	Indian Cancer Congress 2017
11	International Conference on Nanotechnology Addressing Theconvergence of Materials Science, Biotechnology and Medical Science	9-11 Nov. 2017 at Kolhapur (MS)	Centre for Interdisciplinary Research, D.Y. Patil University
12	National Symposium on Animal Experimentation in Biomedical Research: Scientific & Ethical Perspectives (AEBR 2017)	10-11 Nov.2017 Agra (UP).	National Jalma Institute of Leprosy & Other Mycobacterial Diseases
13	Symposium on Nutrikinetic Assessment of Functional Foods from Indian Origin- Their Scientific and Global Perspective	10-11 Nov. 2017 at Rocklands (Udhagamandalam) TN	Jss College of Pharmacy
14	International Conference of the Public Health Foundation of India and the Pacific Basin Consortium	14-16 Nov. 2017 at New Delhi.	Centre For Environmental Health, Public Health Foundation of India
15	Seminar on Trending Technology in Medical Robots for Surgery	16th Nov. 2017 at Coimbatore	Sri Ramakrishna Engineering College
16	Seminar on Advanced Polymer Nanocomposites for Biomedical Applications	16-17 Nov. 2017 at Pollachi (TN)	P.A. College of Engineering & Technology
17	17th Fercap International Conference and 5th (Ferci) National Conference	20-22 Nov. 2017 at AIIMS, New	AIIMS
18	Microcon 2017 on Bridging The Gap: Brodening Thehorizon of Clinical Microbiology	22-26 Nov. 2017 at Ranchi (JKH)	Rajendra Institute of Medical Sciences

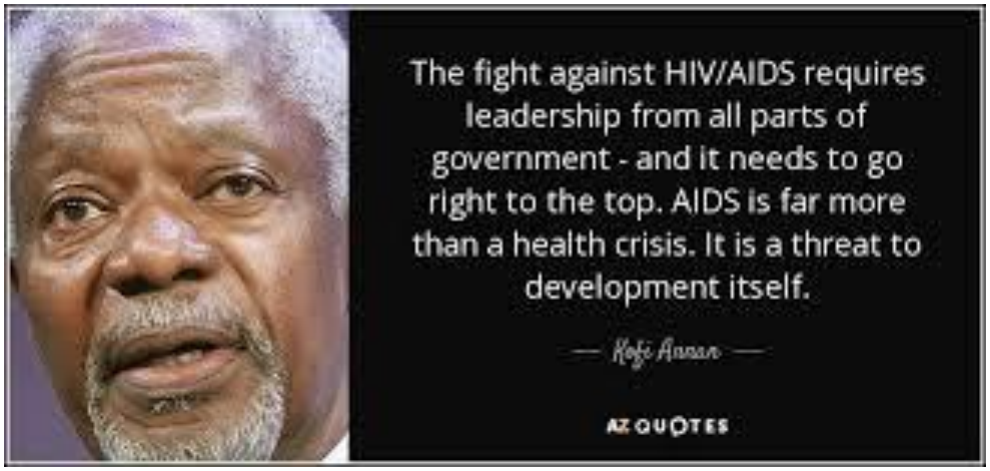
19	Seminar on A Computational Intelligence in the Future of Bioinformatics, Forensic and Biomedical Engineering Sciences-Strategies and Innovation	23-24 NOV. 2017 at Tirunelveli (TN)	Francis Xavier Engineering College
20	Workshop on Virtual Reality and its application to Healthcare Industry	24-25 Nov. 2017 at Perundurai (Erode)TN	Erode Sengunthar Engineering College
21	Workshop on Radiological Safety and Imaging Techniques	25-26 Nov. 2017 at Coimbatore	PSG Institute of Medical Science Research & Hospitals
22	Organizing International Conference on Agricultural, Allied Sciences & Biotechnology for Sustainability of Agriculture, Nutrition & Food Security (ICNCAASBSANFS)	25-26 Nov. 2017 at Varanasi (UP)	Mahima Research Foundation & Social Welfare
23	1st International Conference on Nutrition Before, Beyond and During 1000 Days of Life-Evidence and Action	26-28 Nov. 2017 at Hyderabad (Telangana)	Divn.of Community Studies
24	CPMN – 2017, 4th International Conference on Public Mental Health and Neurosciences	27-28 NOV.2017 at Mumbai	Sarvasumana Association
25	National Seminar on a Multi-Disciplinary Activity in Wireless Sensor Network Regarding Structural Health Monitoring	27-28 Nov. 2017 at Tirunelveli (TN)	Francis Xacier Engineering College
26	Workshop on Economic Evaluation of Health Care Programmes	27-30 Nov. 2017 at Gurgaon (Har..)	Indian Instituteo of Public Health
27	International Conference on Impact of Environment on Women's Health (IEWH 2017)	29TH Nov. – 1st Dec. 2017 at Lucknow (UP)	Amity Institute of Biotechnology, Amity University Uttar Prasesh
28	International Conference on Proteomics in Health and Disease	30th Nov. – 2nd Dec. 2017 at Bhubaneswar (Odisha)	Institute of Life Science (DBT)

Various Technical Committees'/Groups' Meetings

The following meetings of various technical committees/Groups of the Council were held in Nov. Dec.-2017		
1	A Talk on "Evidence and Gap Maps (EGMs)"	2-11-17
2	"The meeting to review evidence	3-11-17
	on BEMPU device".	
3	"Meeting of Grand Challenge Scheme"	3-11-17
4	"Expert review group meeting for evaluation of Public Health Pesticides"	3-11-2017

5	Indian Council of Medical Research Vigilance awareness week	30-10-17 to 4-11-17
6	The meeting to "Discuss the MR lab. Integration Program"	6-11-17
7	26th Sub-Committee Meeting of National Apex Committee for Stem Cell Research and Therapy (NAC-SCRT)	7-11-17
8	"Project Review Committee Meeting in the field of CVD"	7-11-17
9	Informatics, Systems and Research Management Technical advisory Committee meeting	8-11-17
10	"Meeting for grand challenge scheme on CKDu"	10-11-17
11	"The Meeting of Monitoring Committee on Task Force Project on Control of Cancers; a Multiorgan approach"	13-11-17
11	Expert group meeting of task force on Nutrition	13-11-17
12	"A meeting of Indo-US collaboration on prevention of HIV/AIDS and STD's"	13-11-17
13	"Task force meeting ICMR-NIF Project on Validation of Innovative Claims of Herbal Healer"	14-11-17
15	Expert group meeting to discuss the progress of ICMR task force project on "Congenital Deafness in Dhadkai village of Doda district of Jammu & Kashmir"	15-11-17
16	Brain storming meeting on "Cancers in North East region	15-11-17
17	"Technical resource group meeting on evaluation of IMNCI Programme	16-11-17
18	Combined project review committee meeting of	16-11-17
	Biochemistry, Human Genetics, Hematology & Immunology Adhoc & Fellowship	
19	CBBTDEC Meeting	16-11-17
20	"A Meeting to proposed to hold Brainstorming Discussion"	17-11-17
21	The meeting to discuss the "Progress Report Of Each Site"	17-11-17
22	The meeting of expert committee on Alternative to Animals	17-11-17
23	"A workshop on COHPRICA"	16&17th Nov 17
24	"Implementation research on Maternal & Newborn Health"	17-11-17
25	Meeting on the topic "Socio-Behavioural Issues Perspectives of Epileptic Women in India and Their Social Aceptance".	20-11-17
26	PGR on Women's Health	20-11-17
27	The meeting of all stakeholders to finalized the AES/CRF and line list formals	20-11-17
28	Meeting of the ICMR experts committee for discussion with the firm's for various related logistic issues	20-11-17
29	"Investigators' meeting for finalization of study tools and train the investigators'	21-11-17 to 22-11-17
30	Expert Consultation to Deliberate on Integration of Agriculture and Nutrition from Demonstrating Freedom from Hunger	21-11-17
31	Indian Council of Medical Research Department of Health Research – Ministry of Health & Family Welfare Government of India An Interaction with Dr. Soumya Swaminathan (Secretary, Department of Health Research & Director General, ICMR) On the future of Health Research in India	22-11-17
33	The meeting to do the final analysis of the raw data and	22-11-17

	analyzed date of Turenat studies	
34	The meeting of expert group on fellowship to review annual/final reports is proposed	22-11-17
35	The meeting of the Investigators to discuss the issues and progress related to the multicentric project entitled Multicentre trial to study the effect of early active mobilization as compared to three weeks immobilization for claw hand	23-11-17
36	Meeting of the "National Authority for Containment (NAC) for Polio Viruses"	23-11-17
37	Name of meeting expert committee meeting to review the study protocol "Development Of District Level Model To Address Under Nutrition And Hidden Hunger: An Inter-Sectoral Approach	24-11-17
1	Meeting of the "Expert Group To Review The Proposal Submitted by ICMR-NIRRH on New Born Birth Defect Screening And Still Birth Surveillance"	4-12-17
2	Interview for the post of Assistant (OBC)	5-12-17
3	Project advisory group on Pediatric HIV Study	5-12-17
4	A meeting of "Expert committee on Therapeutics, to review the protocols"	5-12-17
5	"Expert group meeting on Meningitis Surveillance"	6-12-17
6	A "walk-in interview for ITRC for SRF"	6-12-17
7	Interview for the post of project Assistant -Typing test for the post of Data Entry Operator- A (OBC)	7-12-17
8	The meeting for "Immunological sub studies to be undertaken in The TB Vaccine Trial	7-12-17
9	The meeting of "Data Management Plan"	7-12-17
10	"Expert group meeting to discuss Data Management And Lab Testing for MR Serosurveys"	11-12-17
11	The meeting of task force/advisory group for the multi-centric task force project entitled" Assessment Of Viral Hepatitis Burden in North East India: A Systematic Study"	12-12-2017
12	"A meeting of the LDCE Mentor Committee Meeting	13-12-2017
13	"Expert group meeting on Indo-US vap"	15-12-2017
14	ICMR-DBT expert group meeting on HIV/AIDS & Microbicides	15-12-2017
15	Meeting of expert group on estimating biomarkers in DBS for cardiovascular risk assessment in geriatric population	15-12-2017
16	The meeting of task force/Advisory group for the multi-Centric task force project entitled" Assessment of viral hepatitis burden in North East India : A Systematic Study"	19-12-2017
17	Meeting of "A longitudinal study of Chronic Kidney Disease of Unknown Etiology (CKDU) burden and risk factors in Andhra Pradesh India"	28-12-2017



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