Hkkjrh; df"k vuqla/kku if=dk] 36(1): 7-17 DOI: 10.18805/BKAP271

eè; çn"k dh efgyk –f'k Jfedk dh ,UFkkikeVh

vkj- vkj- ikrnkj] d- ,u- vxoky] lkHkkdj "kDyk] foØe T;kfr

Hkk-Ñ-vu-i- dUnh; df'k vfHk;kf=dh lLFkku] uchckx] Hkkiky&462 038] e/;&in"k] HkkjrA

ikIr% eb 2021 Lohdr% tu 2021

lkjk"k

Hkkjr e vfèkdk"k efgyk –'kd gLrpfyr vkt kjk d lkFk –f'k dk; djrh gA blfy,] mRikndrk vkj n{krk e lèkkj dju] dfBu Je dk de dju] lj{kk c<ku] –f'k midj.k vkj dk; LFkyk d fMtkbu e ,UFkkikefVd MVk d vuç;kx egRoi.k gA bl ç;ktu d fy, eè;&çn"k jkT; l 22&54 o'k dh vk; leg e p;fur 30 efgyk –f'k Jfedk d ,Fkkikefvd MVk dk ,df=r fd;k x;k FkkA –f'k midj.k vkj dk;LFky d fMtkbu d fy, otu lfgr 30 "kkjhfjd vk;kek dk ekik x;kA ekè; (mean)] ekud fopyu (SD)] U;ure (min.)] vfèkdre (max.)] fHkUurk d x.kkd (CV) vkj 1st] 5th] 50th] 95th vkj 99th çfr"krrk ekuk d eY;k dh x.kuk "kjhj d vk;kek l dh xÃA efgyk –f'k Jfedk dk vkl r otu vkj dn Øe"k 53 fdykxke vkj 1536 feyheVj ik;k x;kA Hkkjr d fofHkUu jkT;k dh efgyk –f'k Jfedk d ,UFkkikefVd vkdMk e ,UFkkikefVd vk;kek e ,d cMk cnyko n[kk x;kA fi;jlu lglcèk x.kkd ¼PCC½ dh x.kuk fo'k;k d p;fur ,Fkkikefvd vk;kek d chp dh xÃ FkhA ekik x;k MVk dk lglcèk x.kkd ¼correlation coefficient½ 0-65&0-98 e ik;k x;kA

"kCn dth% ,Fkkikefvh] dk;LFkYk] –f'k midj.k] efgyk Ñ'kd] çfr"krrkA

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Anthropometry of Female Agricultural Workers of Madhya Pradesh

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ABSTRACT

Most of the agricultural operations in India are performed manually with hand tools and equipment by female agricultural workers. This prompted designers to use female anthropometric data in designing of farm equipment and workplaces in order to reduce drudgery, to enhance safety, to improve performance, productivity and efficiency. A study was conducted to collect the anthropometric data of selected 30 female agricultural workers in the age group of 22-54 years from Madhya Pradesh state. For design of agricultural tools, equipment and workplaces the important, thirty eight body dimensions including weight were identified and measured. The values of mean, standard deviation (SD), minimum, maximum, coefficient of variation (CV) and 1st, 5th, 50th, 95th and 99th percentile values were calculated of selected body dimensions. The mean weight and stature of female agricultural workers were found to be 53 kg and 1536 mm, respectively. A large variation in anthropometric dimensions in the anthropometric data of female farm workers of different states of India and other countries was observed. Pearson correlation coefficients (PCC) were calculated among selected anthropometric dimensions of subjects. The correlation coefficients of measured data varied from 0.65-0.98.

Key words: Anthropometry, Body measurements, Farm equipment, Female agricultural worker, Percentile.

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lkLRkkouk

xkeh.k Hkkjr e] efgyk, n"k dh —f'k vFk0;oLFkk dk vkdkj nu e egRoi.k Hkfedk fuHkkrh gA Hkkjrh; —f'k e] efgyk, pkj çdkj dh Hkfedk, fuHkkrh g tkfd ,d Jfed ¼"kfä dk ,d lkr½ d :i e] ,d v,ijVj ¼,d fu;=d½ d :i e] ,d çcèkd ¼,d fdlku½ d :i e vkj ,d m|eh ¼,d 0;olk;h½ d :i eA cnyr ifj–"; e] 2020 rd —f'k e efgyk depkfj;k dh Hkkxhnkjh 45 çfr"kr rd c< tk,xh] ;kuh 2020 e 2 djkM 30 yk[k d dy vuekfur —f'k dk;cy e l] yxHkx 1 djkM 3 yk[k efgyk Ñ'kd gkxh ¼Mehta *et al.*, 2014½A ,lk gku dh mEehn T;knk g D;kfd i#'k Jfed ;k rk vU; xj&—f'k xfrfofèk;k e "kkfey gkx ;k vU; ukdfj;k d fy, "kgjk dh vkj iyk;u djxA bl çdkj] Hkfo'; e efgyk Jfed Hkkjrh; —f'k e ,d egRoi.k Hkfedk fuHkk,xhA bld vykok] —f'k e efgyk Jfedk d fgrk dh j{kk dju vkj okLrfod vFkk e efgyk l"kfädj.k d fy, efgyk Jfedk d fy, [kr midj.k vkj dk;LFky fodflr djuk vko";d gA ftld fy; efgyk —f'k Jfedk d ,FkkikefVd MVk dk "kkfey fd;k tk ldrk gA

,FkkikeVh "kjhj d vk;kek tl fd otu] igp] dn] cBu dh ÅpkÃ vkfn d eki l lcfèkr gA ikIr dh xb tkudkjh dk mi;kx Ñf'k midj.k vkj dk;LFkyk d fMtkbu e fd;k tk ldrk gA fMtkbu e bl tkudkjh dk mi;ä mi;kx çn"ku] n{krk] vkjke vkj lj{kk e lèkkj dj ldrk g ¼Pheasant, 2003½A Ñf'k Jfedk d ,FkkikefVd vk;ke Çyx] uLy] vk;] ik'k.k dh fLFkfr vkj dke dh ç—fr d vulkj fHkUu gk ldr gA Hkkjr e] ch tkjki.k dh r;kjh l ydj Qly dVkÃ d ckn d v,ij"ku rd d vfèkdk"k lpkyu Jfedk }kjk gLrpkfyr midj.kk dk mi;kx djd fd, tkrk gA cgrj çn"ku] dk;d"kyrk] vkjke vkj lj{kk dk çkIr dju d fy, —f'k midj.kk vkj dk;LFkyk dk —f'k Jfedk d ,FkkikefVd MVk dk è;ku e j[kr g, fMtkbu fd;k tkuk pkfg,A ftll fd cgrj ekuo&e"khu lEcU/k d fy,] y{; Jfedk d ,FkkikefVd MVk dk —f'k midj.k d fMtkbu e mi;kx fd;k tkuk pkfg,A ,FkkikefVd MVk dh vKkurk(eukoKkfud vlfoèkk] "kkjhfjd Fkdku vkj Jfedk@v,ijVjk dk nh?kdky e vkj gkfudkjd gk ldrh gA gkykfd] fMtkbuj vc ,xkukfeDl d vuç;kx d ckj ltd g vkj fu/kkfjr tul[;k d ,FkkikefVd MVk dk "kkfey fd;k x;k g] ¼Potdar *et al.*, 2011, Khadatkar *et al.*, 2018, Gite *et al.*, 2020½A fodflr n"kk e] mi;kxdrk vkckn dk ,FkkikefVd MVk lnHk vkj mi;kx d fy, miyC;k gA Yadav *et al.*, (1997) u crk;k fd Hkkjrh; vkj if"peh n"kk d ,FkkikefVd MVk e dkQh vrj FkkA Hkkjrh; —f'k Jfedk ij ,FkkikefVd MVk {k= fo"k'k d fy, ,d= fd, x, ¼Gite and Yadav, 1989, Yadav *et al.*, 2000, Dewangan *et al.*, 2005, Gite *et al.*, 2020½A bld vykok] —f'k Jfedk dk ,FkkikefVd MVk {k= cnyu ij fHkUu gk tkrk gA bld vykok] eè; çn"k jkT; d Hkkiky fty l efgyk —f'k Jfedk d ,FkkikefVd MVk dk ,d= dju vkj mudk fo"y'k.k dju d fy, vè;;u fd;k x;kA

lkexh vkj fofèk

,FkkikefVd MVk dk ,d= dju d fy; 30 efgyk Ñf'k Jfedk d ueuk dk fy;k x;k ftldh vk; lhek 22 l 54 o'k FkhA p;fur efgyk Jfed deÊ Hkkiky d vkÃlh,vkj&lVy bLVhVîV v,Q ,xhdYpj bthfu;Çjx ¼ICAR-CIAE, Bhopal½ d [krk ij fofHkUu —f'k dk;k e yxh gÃ FkÈA v/;;u dju d igy ;g lfuf"pr fd;k x;k Fkk fd p;fur efgyk, "kkjhfjd :i l fQV gk] fdlh chekjh l ihfMr u gk vkj vè;;u e Hkkx yu dh bPNk j[kr gkA otu lfgr dy 38 "kjhj d vk;kek dk eki x;k] tk —f'k midj.k vkj dk;LFkyk d fMtkbu e egRoi.k FkA ,FkkikefVd lkr iLrd ¼NASA, 1978a½ e l>k, x, p;fur ,FkkikefVd vk;ke eki LFkyk d ekud "kCnkoyh fp= 1 e fn[kk, x, gA MVk lxg dh çfØ;k dk ikjHk dju d igy fo'k;k dh eki yu fd ifØ;k dk le>;k x;k vkj lg;kx çkIr fd;k x;k ftll eki fd lVhdrk lfuf"pr gk ldA "kjhj d otu dh eki d fy,] 0-1 fdykxke dh lVhdrk d lkFk ,d otu ekiu d midj.k dk mi;kx fd;k x;kA "k'k 37 "kkjhfjd eki d fy,] 1 fe-eh dh lVhdrk d lkFk gkiMu ,FkkikehVj ¼Harpenden anthropmeter½ vkj eki Vi dk mi;kx fd;k x;kA 17 "kkjhfjd eki dk [kMh enk e] 15 ekik dk cBu dh eæk e vkj 6 eki e cB ;k [kM vklu e ekik x;k gA bld vykok] nk ,UFkkikefVd lpdkd vFkkr c,Mh ekl bMDl ¼BMI½ vkj lki{k cB ÅpkÃ ¼RSH½ dk lyXu fd; x, ,FkkikefVd MVk l fudyk x;kA BMI dk "kjhj ctu ¼fdykxke½ d :i e ifjHkkf'kr fd;k x;k g] tkfd dn d ox d :lk e foHkkftr fd;k x;k gA tcfd RSH dn vkj

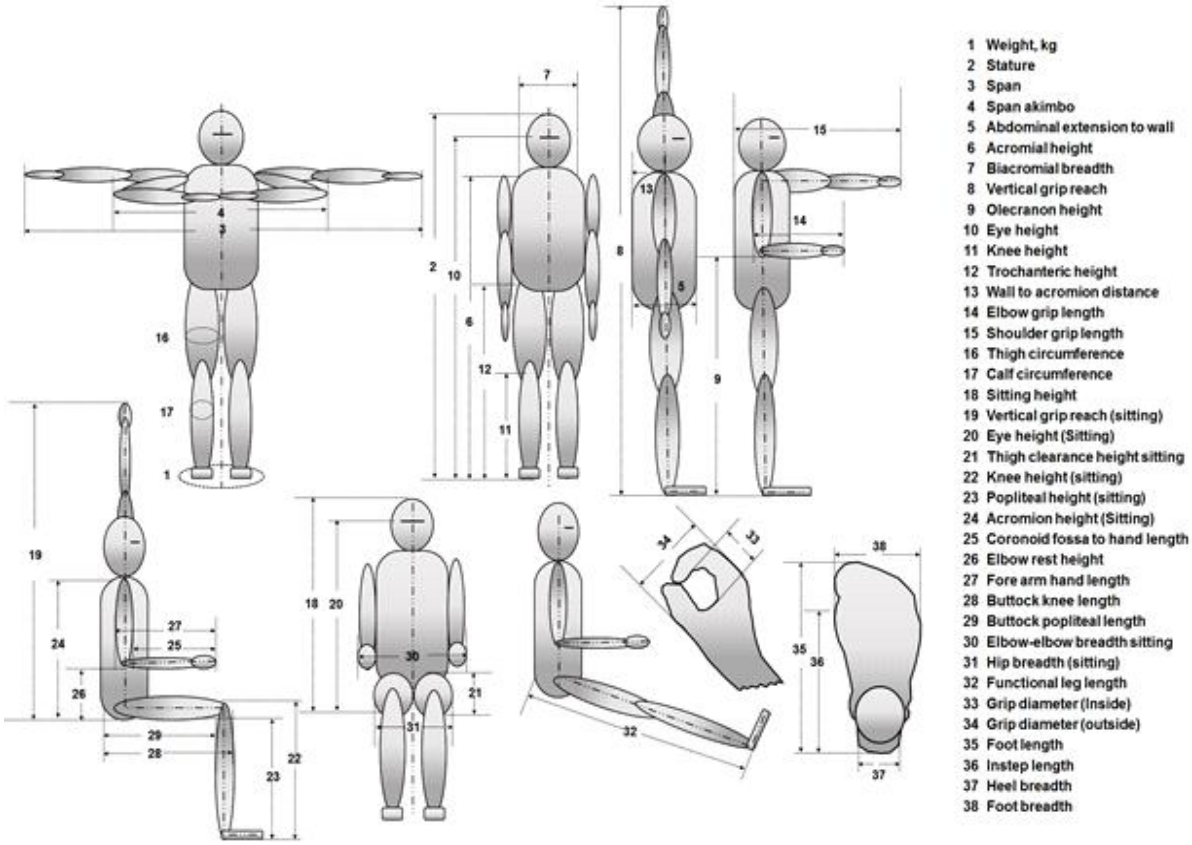
cBu dh ÅpkÃ dk vuikr gA fp= 1 [kM gku] cBu vkj [kM gku@cBu dh eækvk e eki x, vk;kek dk n"kk;k x;k gA

,df=r ,FkkikefVd MVk dk SAS l,¶Vo;j e vk;kr fd;k x;k Fkk tkfd ,e ,l ,Dly d ,Dly "khV e buir d rkj ij lgtk x;k Fkk ftldk lkf[;dh; fo"y'k.k fd;k x;kA Ukeu d legk e MVk lV d çR;d vk;kek dk blfy; pd fd;k x;k ftll ;g lfuf"pr gk ld fd o ,d lkekU; forj.k dk çfrfufèkRo djr gA ,FkkikefVd vk;kek dk ih;jlu lglcèk x.kkd ¼PCC½ d efVDl d chp çkIr fd;k x;k FkkA ,FkkikefVd vk;kek d ekè; (mean)] ekud fopyu (SD)] U;ure (min.)] vfèkdre (max.)] vkj fHkUurk d x.kkd (CV) ifjoruh; ekuk dh x.kuk mud dLVe Qkeyk dk ,Dly e fuEer l=k e 1st] 5th] 50th] 95th vkj 99th çfr"krrk e ikIr fd;k x;kA vè;;u d ifj.kkek dh ryuk Hkkjr d fofHkUu jkT;k vkj vU; n"kk d fofHkUu "kkèk e fjikV fd, x, ,FkkikefVd vkdMk d lkFk dh xÃA bld vykok 18 fo"k'k "kkjhfjd vk;kek d 5th] 50th] vkj 95th çfr"krrk —f'k Jfedk d [kM vuikr d vrj dk fpf=r dju d fy, [kM vkj cB nkuk eæk e puk x;k FkkA [kM gku dh eæk e ekih xÃ dy 8 "kkjhfjd vk;kek tl fd vk[k dh ÅpkÃ] ,Økfe;y ÅpkÃ] v,yØkuu ÅpkÃ] VkdUVfjd ÅpkÃ] ?kVu dh ÅpkÃ] ck;Økfe;y pkMkÃ] dkguh&dkguh dh pkMkÃ vkj fgi dh pkMkÃ dk p;u fd;k x;k ¼fp= 2½A bld vykok] cBu dh eæk e fuEufyf[kr 10 'kjhj d vk;kek dh cBu dh ÅpkÃ] vk[k dh ÅpkÃ ¼cBdj½] ,Økfe;u dh ÅpkÃ ¼cBdj½] dkguh dh ÅpkÃ] ikiyhVkby ÅpkÃ ¼cBdj½] ?kVu dh ÅpkÃ ¼cBdj½] dèk dh yckÃ] dkguh dh yckÃ cVd ikiyhy yckÃ vkj cVd ?kVu dh yckÃ dk p;u fd;k x;k ¼fp= 3½A

ifj.kke vkj ppk

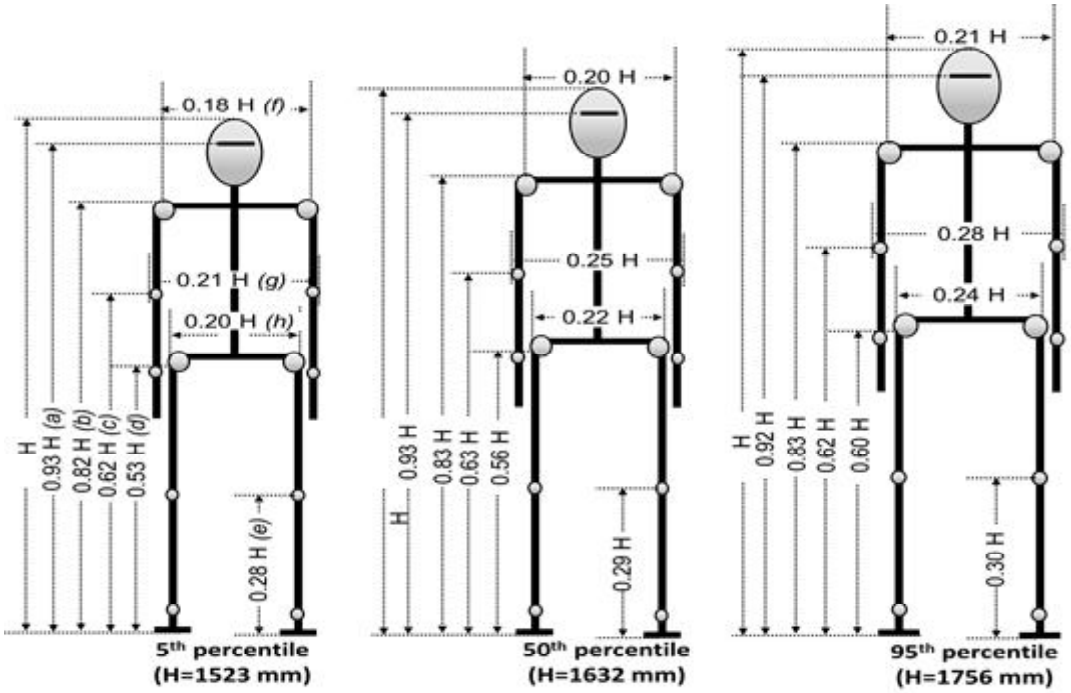
v½ efgyk —f'k Jfedk dk ,FkkikefVd MVk

p;fur efgyk —f'k Jfedk d ,FkkikefVd MVk dh x.kuk(vklr] ekud fopyu ¼SD½ fHkUurk dk x.kkd ¼CV½ vkj çfr"krrk eku ¼1st] 5th] 50th] 95th vkj 99th½ dk rkfydk 1 e fn[kk;k x;k gA efgyk —f'k Jfedk dk vklr otu vkj dn l[;k Øe"k 53 fdykxke vkj 1536 fe-eh FkhA efgyk Jfedk d dn d 5th vkj 95th çfr"krrk d chp 154

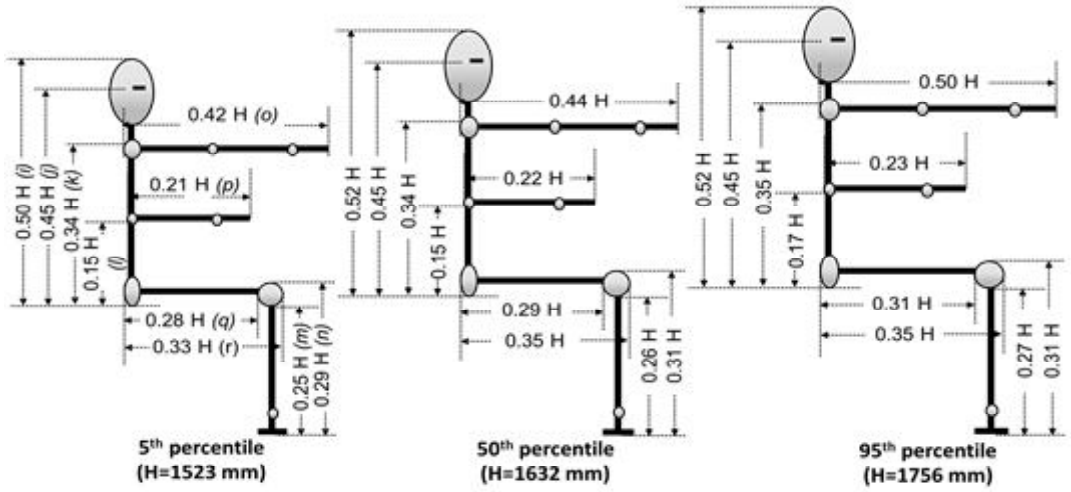


fp= 1: [kM gku vkj cBu dh eæk e ,UFkkikeVh vk;keA

feyhehVj dk vrj FkkA p;fur efgyk –f'k Jfedk dh [kMh eæk e vklr Liu] ,Økfe;y ÅpkÃ] vk[kk dh ÅpkÃ] v,yØkuu ÅpkÃ] VkdUVfjd ÅpkÃ vkj ?kVu dh ÅpkÃ Øe"kh 1561 (±71), 1271 (±42), 1427 (± 47), 960 (± 33), 856 (59) vkj 448 (±27) feyhehVj FkhA bld lkFk vklr cBd Åpkb] dèk l idM dh yckÃ vkj [kMh eæk e dkguh idM dh yckÃ Øe"kh 1840 (±63), 679 (±65), vkj 336 (± 23) feyhehVj FkhA pu g, efgyk –'kd dh cBu dh eæk e vklr cBu dh ÅpkÃ] vk[k dh ÅpkÃ] rh{.k ÅpkÃ] dkguh dh ÅpkÃ] ?kVu dh ÅpkÃ vkj



fp= 2% [kMh eæk e e/; Hkkjr d fofHkUu çfr'kr efgyk –f"k Jfedk d fy, dn ¼H½ d ,d lekjkg d :i e 2 lxeVy vuikr ¼a½ vk[k dh Åpkb] b½ ,Økfe;y Åpkb] c½ vkyØ,uu Åpkb] d½ rkuk'kkg Åpkb] e½ ?kVu dh Åpkb] f½ chØkfe;y pkMkb] g½ dkguh&dkguh pkMkb] h½ dYgk dh pkMkb¼A



fp= 3% vklu cB voLFkk e e/; Hkkjr d fofHkUu çfr"kr efgyk –f"k Jfedk d fy, dn ¼H½ d ,d lekjkg d :i eA ¼h½ cBu dh Åpkb] j½ vk[k dh Åpkb ¼cBuk½ k½ ,Økfe;u dh Åpkb ¼cBuk½] l½ dkguh dh Åpkb] Åpkb½ vkckn dh Åpkb ¼cBuk½] n½ ?kVu dh Åpkb ¼cBuk½] o½ d/k dh idM dh yckb] p½ dkguh idM dh yckb] q½ cVd ikiyhVy yckb] r½ cVd ?kVu dh yckb¼A

rkfydk 1% efgyk —f"k Jfedk dk ,Fkkikefd lc/kh MVk ¼n ¾ 30½A

Øekd	,Økfue ekiu dk vklr		SD ¼±½	CV ¼%½	U;ure	igyk çfr'krrk	5oh çfr'krrk	50oh çfr'krrk	95oh çfr'krrk	99oh çfr'krrk	vf/kdre
	[kM gku dh eæk										
1	WT	otu] fdyk	53	10	18-8	36	37	40	51	68	76	79
2	ST	dn	1536	51	3-3	1449	1452	1462	1531	1616	1625	1628
3	SP	Liu	1561	71	5-2	1406	1426	1477	1556	1670	1681	1684
4	SPA	Liu vfdEck	787	41	16-9	705	709	723	780	853	855	856
5	AE	iV dh nhokj	261	44	3-3	184	184	186	264	338	349	352
6	AH	,Økfe;y dh Åpkb	1271	42	4-5	1200	1201	1206	1268	1340	1349	1352
7	BB	ck;kekfe;y dh pkMkb	308	25	8-0	257	257	259	310	342	347	348
8	VGR	ofVdy fxi rd igp	1840	63	3-4	1740	1742	1750	1833	1930	1941	1945
9	OH	vkyØkuku dh Åpkb	960	33	3-4	906	906	907	968	1002	1005	1006
10	EH	vk[k dh Åpkb	1427	47	6-9	1355	1356	1357	1425	1490	1496	1498
11	KH	?kVu dh Åpkb	448	27	14-6	402	403	404	450	488	502	508
12	TH	=kNUrfjp dh Åpkb	856	59	6-9	760	763	774	851	962	990	993
13	WAD	nhokj l ,Økfe;u dh njh	96	14	9-6	75	75	77	99	116	123	124
14	EGL	dkguh idM dh yckb	336	23	4-9	297	300	306	330	375	377	377
15	SGL	d/k dh yckb	679	65	7-4	608	608	615	675	806	882	883
16	TC	tk?k dh ifjf/k	446	48	10-8	360	361	371	458	510	527	534
17	CC	fiMyh dh ifjf/k	310	26	8-3	270	271	274	305	348	359	363
	cBu dh eæk										
18	SH	cBu dh Åpkb	797	37	4-7	709	709	725	803	846	858	861
19	VGRS	ofVdy fxi dh igp ¼cBuk½	1109	35	3-2	1069	1070	1073	1098	1172	1181	1184
20	EHS	vk[k dh Åpkb ¼cBuk½	697	24	3-4	650	650	656	696	730	737	738
21	TCH	tk?k dh Åpkb ij cBuk	125	17	13-8	95	95	95	122	152	153	154
22	KHS	?kVu dh Åpkb ¼cB½	465	23	5-0	415	416	420	471	498	504	506
23	PHS	ikiyhVy dh Åpkb ¼cBuk½	397	21	5-2	343	349	369	400	435	437	437
24	AHS	,Økfue dh Åpkb ¼cBuk½	527	21	4-0	503	503	503	523	565	571	573
25	CFHL	dkjku,bM Qkl l gkFk dh yckb	371	19	5-2	325	331	346	372	401	405	406
26	ERH	dkguh dh Åpkb	235	19	8-2	210	211	212	235	272	287	288
27	FAHL	gkFk dh yckb	444	25	5-6	404	406	414	440	491	502	503

Table 1: Continue....

Table 1: Continue....

28	BKL	cVd ?kVu dh yckb	535	26	12-9	479	479	481	537	571	585	589
29	BPL	cVd ikiyhVy dh yckb	447	33	9-9	394	398	409	448	503	507	507
30	EEBS	dkguh dkguh pkMkb	386	50	5-4	293	294	304	385	454	484	496
31	HBS	dYgk dh pkMkb ¼cB½	334	33	6-6	284	284	286	330	388	394	395
32	FLL	dk;kRed ij dh yckb	938	51	7-6	847	850	859	935	1019	1039	1042
		[kM+ / cB vkiu										
33	GDI	idM dk 0;kl ¼vnj½	44	3	3-3	37	38	39	43	48	49	49
34	GDO	idM dk 0;kl ¼ckgj½	97	8	6-1	83	84	85	97	107	110	111
35	FL	QV dh yckb	240	13	7-9	213	216	225	238	262	264	264
36	ISL	buLVi dh yckb	184	14	5-3	162	164	170	180	213	214	215
37	HL	gby dh pkMkb	71	9	13-2	50	50	50	71	85	86	86
38	FB	QV dh pkMkb	100	6	5-7	90	90	90	101	108	109	109
		lpd										
39	BMI	c,Mh ekl bMDl ¼BM½	22-5	4-1	18-2	15-4	16	17-6	21-7	29-5	32-5	33-7
40	RSH	lki{k cBu dh Åpkb	0-52	0-02	4-5	0-45	0-45	0-47	0-52	0-54	0-54	0-54

eki bdkbZ feyhehVj] tc rd vU;Fkk fufn'V u gkA

ikiYkhVy dh ÅpkÃ Øe"k 797 (±37), 697 (±24), 527 (±21), 235 (±19), 465 (±23) vkj 397 (±21) feyhehVj FkhA tcfd vkl r Åèokèkj ¼[kMh½ idM igp] lkeu dh vkj gkFk dh yckÃ] cVd ?kVu dh yckÃ vkj cVd ikiyhVy dh yckÃ Øe"k 1109 (±35), 444 (±25), 535 (±26) vkj 447 (±33) feyhehVj FkhA tgk fupyh lhek çfrcèkkRed dkjd g tl fu;=.k igp] çn"ku dh ÅpkÃ] lpkyu cy vkfn ogk ij midj.k ;k dk; LFky d fMtkbu d nkjku] 5th çfr"krrk eY; dk mi;kx fd;k tkuk pkfg,A tgk Åijh lhek g çfrcèkkRed dkjd tl fd fDyhjl] lhV d vk;ke] njokt dh ÅpkÃ vkfn dk mi;kx fd;k tkrk g ogk ij 95th çfr"krrk eY; dkfMtkbu e mi;kx fd;k tkuk pkfg,A ifj.kke l ;g ldr feyrk g fd otu] Liu vfdEck] ?kVu dh ÅpkÃ] tk?k dh ifjfèk] tk?k fudkl h dh ÅpkÃ ij cB] cVd ?kVu dh yckÃ vkj ,Mh dh pkMkÃ d fy; CV dk eku 10% l vf/kd Fkk ¼rkfydk 1½ gkykfd] vU; ,FkkikefVdeki d fy, CV eku 10% l de FkA Pheasant, 2003 d vulkj 70% l vfèkd ifjdfyr CV d eku lhek d Hkhrj gA vi{kk—r vfèkd CV gku oky "kjhj d eki dk mi;kx vfèkd lkoèkkuh l fd;k tkuk pkfg,A Pheasant, 2003 d vulkj] lki{k cBu dh ÅpkÃ ¼RSH½ 0.50 l de oky NkV fo'k;k dk Þyc ij okyÞ d :i e oxÊ—r fd;k tkrk g] tcfd RSH e 0.53-0.55 d chp yEc ykxk dk Þy?k ijÞ d :i e oxÊ—r fd;k tkrk gA vkl r RSH oky leg dk 0.51-0.53 d chp y?k vkj yc ij d chp oxÊ—r fd;k x;k gA rkfydk 1 l] ;g n[kk x;k g fd 0.50 l de RSH oky NkV Jfedk ¼1st çfr"krrk vkj 5th çfr"krrk½ dk Þyc ij okyÞ d :i e oxÊ—r fd;k tkrk g vkj 0.5 çfr"kr d RSH eY; oky 50th çfr"krrk Jfedk dk NkV vkj yc ijk d chp oxÊ—r fd;k tkrk g] tcfd mPp çfr"krrk Jfedk ¼95th çfr"krrk vkj 99th çfr"krrk½ dk Þy?k ijÞ d :i e oxÊ—r fd;k x;k g ftle RSH dk eku 0.54 gA

rkfydk 2 fi;jlu lglcèk x.kkd ¼PCC½ d efVDl dk fofHkUu ,UFkkikefVd vk;kek l n"kk;k x;k gA fd egRoi.k lglcèk d x.kkd ¼coefficients of correlation½ 1% d Lrj ij bfxr fd; x; gA ; x.kkd fofHkUu ,UFkkikefVd vk;kek d chp lcèkk dk tkuu d fy, fuèkkfjr fd, x, Fk vkj bl rjg d lglcèkk d vkèkkj ij midj.k fMtkbu d fu.k; dh lhek r; dj ldr gA ;g n[kk x;k fd vfèkdk"k ,Fkkikefvd ekinMk dk ,dkrj

rkfydk 2% fi;jlu lglc/k x.kkd ¼PCC *½ d efVDl d chp e ekik ,Fkkiksa vk;keA

,FkkikefVd vk;ke	WT	ST	AH	SP	SPA	BB	VGR	OH	GDI	GDO	EH	KH	WAD	TC	SH	VGRS	EHS	TCHS	AHS	CFHL	FAHL	EGL	BKL	FL	ISL	HL
AH	0·29	0·98	1·00																							
SP	0·39	0·82	0·80	1·00																						
SPA	0·43	0·74	0·70	0·77	1·00																					
AE	0·67	0·40	0·41	0·56	0·42																					
VGR	0·28	0·85	0·82	0·92	0·67	0·38	1·00																			
OH	0·24	0·83	0·81	0·75	0·58	0·24	0·87	1·00																		
GDI	0·31	0·74	0·74	0·70	0·73	0·37	0·70	0·68	1·00																	
EH	0·45	0·93	0·91	0·81	0·71	0·42	0·87	0·85	0·70	0·61	1·00															
KH	0·27	0·64	0·58	0·58	0·47	0·25	0·70	0·64	0·48	0·67	0·68	1·00														
WAD	0·42	0·14	0·12	0·46	0·31	0·68	0·37	0·12	0·32	0·55	0·24	0·28	1·00													
TC	0·69	0·19	0·17	0·35	0·54	0·39	0·32	0·17	0·26	0·27	0·42	0·29	0·48	1·00												
CC	0·67	0·05	0·06	0·13	0·24	0·21	0·10	0·06	0·02	0·13	0·26	0·01	0·36	0·76												
VGRS	0·23	0·62	0·59	0·66	0·56	0·39	0·64	0·47	0·45	0·41	0·58	0·50	0·35	0·36	0·46	1·00										
EHS	0·34	0·45	0·45	0·34	0·73	0·12	0·24	0·31	0·50	0·22	0·45	0·11	0·14	0·52	0·60	0·45	1·00									
TCHS	0·57	0·30	0·31	0·27	0·68	0·13	0·22	0·23	0·44	0·17	0·41	0·18	0·18	0·82	0·49	0·29	0·77	1·00								
AHS	0·33	0·52	0·49	0·54	0·68	0·35	0·47	0·30	0·35	0·47	0·52	0·31	0·48	0·49	0·74	0·62	0·61	0·46	1·00							
CFHL	0·14	0·58	0·54	0·52	0·40	0·27	0·60	0·50	0·43	0·70	0·52	0·65	0·36	0·05	0·18	0·69	0·09	&0·06	0·37	1·00						
FAHL	0·41	0·74	0·73	0·85	0·84	0·50	0·78	0·59	0·66	0·64	0·73	0·48	0·60	0·45	0·53	0·61	0·46	0·42	0·65	0·59	1·00					
EGL	0·55	0·66	0·65	0·82	0·69	0·51	0·73	0·58	0·48	0·47	0·69	0·43	0·58	0·52	0·50	0·61	0·43	0·42	0·64	0·37	0·82	1·00				
BKL	0·41	0·70	0·67	0·68	0·57	0·62	0·77	0·69	0·59	0·57	0·80	0·69	0·37	0·44	0·14	0·48	0·30	0·29	0·47	0·47	0·65	0·64	1·00			
BPL	0·19	0·51	0·49	0·51	0·39	0·21	0·55	0·52	0·55	0·21	0·51	0·60	&0·05	0·16	&0·13	0·31	0·17	0·16	0·04	0·18	0·23	0·30	0·70			
EEBS	0·69	0·26	0·24	0·32	0·64	0·21	0·16	0·15	0·40	0·38	0·35	0·24	0·35	0·75	0·39	0·37	0·67	0·79	0·37	0·20	0·45	0·43	0·21			
HBS	0·65	0·23	0·20	0·48	0·48	0·65	0·40	0·16	0·41	0·40	0·46	0·27	0·65	0·84	0·13	0·42	0·39	0·55	0·46	0·15	0·51	0·54	0·52			
FL	0·52	0·69	0·65	0·73	0·76	0·44	0·72	0·63	0·71	0·77	0·72	0·69	0·46	0·48	0·37	0·65	0·42	0·44	0·46	0·68	0·78	0·68	0·65	1·00		
ISL	0·48	0·64	0·61	0·78	0·77	0·41	0·75	0·60	0·55	0·72	0·69	0·64	0·57	0·53	0·42	0·63	0·36	0·44	0·54	0·67	0·89	0·78	0·62	0·88	1·00	
FLL	0·49	0·70	0·65	0·84	0·65	0·54	0·75	0·55	0·51	0·57	0·73	0·61	0·55	0·43	0·34	0·60	0·32	0·23	0·69	0·46	0·72	0·83	0·78	0·63	0·66	
FB	0·38	0·11	0·09	0·02	0·02	0·53	0·12	0·26	0·18	0·41	0·28	0·51	0·36	0·38	&0·01	0·05	0·16	0·25	0·15	0·07	0·05	0·24	0·49	0·28	0·17	0·69

ckYM ¼Bold½ e eku crkrk g fd eku 1% d Lrj ij egRoi.k gA

rkfydk 3% Hkkjr d fofHkUu jkT;k dh efgyk —f"k Jfedk d egRoi.k [kM vkj cB ,UFkkikefVd vk;kek dk vFk g ¼Gite *et al*-] 2020½A

,UFkkikefVd vk;ke	oreku v/;;u	v#.kkpy çn'k	xtjkr	fg-ç-	tEe vkj d'ehj	e-ç-	egkjk"V	e?kky;	fetkje	vkfM'kk	itkc	jktLFkku	flfDde	rfeyukM	mÙkj çn'k	if'pe cxky
dn	1536	1525	1521	1573	1538	1538	1504	1507	1552	1516	1542	1528	1510	1508	1508	1499
cBu dh Åpkb	797	801	754	787	777	784	767	784	804	784	763	782	789	754	780	764
nhokj l ,Økfe;u dh njh	96	118	94	103	101	96	97	105	116	76	105	92	103	107	101	92
cB g, ,Økfe;u dh Åpkb	527	548	516	549	531	534	518	534	547	541	541	532	538	521	522	513
dkguh dh Åpkb	235	236	192	216	200	205	206	228	230	221	207	222	231	187	208	210
d/k dh yckb	679	672	692	647	686	670	676	667	655	630	706	685	698	619	698	680
dkguh dh yckb	336	330	321	344	324	328	310	305	323	335	332	329	325	329	332	299
fc;kØkfe;y pkMkb	308	335	304	351	315	292	272	287	336	281	331	262	300	282	284	288
dkguh&dkguh dh pkMkb	386	374	368	398	338	366	323	349	382	351	406	363	418	357	357	330
iV dk foLrkj	261	212	220	245	238	226	209	185	208	209	213	228	267	196	217	213
cB tk?k fudkl h	125	140	132	126	124	117	131	135	151	104	144	128	140	110	123	117
?kVu dh Åpkb ij cB	465	448	477	472	484	473	461	469	463	475	460	492	465	475	470	450
ikiyhVy dh Åpk b¼cBu e½	397	351	418	423	404	392	386	395	356	415	359	416	375	394	402	384
cVd&?kVu dh yckb	535	504	531	486	499	522	519	512	512	460	521	483	503	525	509	524
cVd&ikiyhy yckb	447	378	441	429	419	450	438	424	391	399	435	415	425	441	435	408
ij dh yckb	240	227	228	208	236	229	223	221	226	223	234	231	219	218	228	227
dh pkMkb ¼cBu e½	334	307	318	332	330	312	296	310	323	267	331	314	363	286	304	310
ij dh pkMkb	100	91	89	87	92	88	91	88	86	91	88	94	90	83	88	88
dk;kRed ij dh yckb	938	898	911	881	931	939	935	958	907	910	968	960	866	987	934	899
RSH	0-52	0-53	0-50	0-50	0-51	0-51	0-51	0-52	0-52	0-52	0-49	0-51	0-52	0-50	0-52	0-51

eki bdkbh feyhehVj] tc rd vU;Fkk fufn"V u gkA

*dn ¼bdkb jfgr½ cBu dh Åpkb dk vuikrA

rkfydk 4% fofHkUu n'kk dh efgyk —f"k Jfedk d egRoi.k [kM vkj cB ,UFkkikefVd vk;kek dk eryc gA

'kjhj dh fo'k"krk	oreku v/;;u	vejhdk[a]	;w d[ab]	ikyM[b]	g,yM[b]	irxky[b]	LohMu[c]	rdh[e]	ukbthfj;k[f]	fbMkuf'k;k[e]	rkboku[d]	phu[d]	tkiku[d]	dkfj;k[d]	fQfyfiuke[e]
dn	1536	1626	1610	1575	1650	1565	1674	1598	1600	1525	1573	1576	1569	1588	1539
cBu dh Åpkb	797	861	850	825	875	865	892	848	770	774	848	855	850	866	799
nhokj l ,Økfe;u dh njh	96	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cB g, ,Økfe;u dh Åpkb	527	564	555	565	565	595	577	558	560	506	NA	NA	NA	NA	NA
dkguh dh Åpkb	235	236	235	230	240	250	238	232	170	205	254	251	253	263	219
d/k dh yckb	679	711	705	735	705	675	NA	695	670	667	NA	NA	NA	NA	NA
dkguh dh yckb	336	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
fc;kØkfe;y pkMkb	308	NA	355	350	360	300	356	NA	240	NA	331	351	348	352	NA
dkguh&dkguh dh pkMkb	386	NA	NA	NA	NA	NA	444	NA	NA	NA	NA	NA	NA	NA	NA
iV dk foLrkj	261	NA	255	250	295	260	227	NA	250	NA	NA	NA	NA	NA	NA
cB tk?k fudkyh	125	NA	155	140	150	165	145	NA	14-2	NA	NA	NA	NA	NA	NA
?kVu dh Åpkb ij cB	465	505	500	485	505	480	521	494	490	490	472	458		470	470
pcrj dh Åpkb ij cB	397	NA	400	420	405	365	444	NA	420	NA	379	382	362	384	NA
furc&?kVu dh yckb	535	574	570	565	600	570	596	NA	590	527	530	529	531	528	527
furc&ikiyhy yckb	447	490	480	450	495	470	477	NA	490	451	439	433	437	449	451
ij dh yckb	240	239	NA	NA	NA	NA	243	232	235	223	NA	NA	NA	NA	NA
fgi dh pkMkb ¼cBu e½	334	376	370	360	395	400	416	308	410	299	322	317	333	319	364
ij dh pkMkb	100	8-9	NA	NA	NA	NA	90	88	90	97	NA	NA	NA	NA	NA
dk;kRed ij dh yckb	938	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
vkj ,l ,p ¼RSH½	0-52	0-53	0-53	0-52	0-53	0-55	0-53	0-53	0-48	0-51	0-54	0-54	0-54	0-55	0-52

eki bdkbh feyheVj] tc rd vU;Fkk fufn"V u gkA *dn ¼bdkb jfgr½ cBu dh Åpkb dk vuikrA

¼a[MacLeod, 2000- b[Borroso *et al.*, 2005. c[Hanson *et al.*, 2009- d[Lin *et al.*, 2004. e[Syuaib, 2015. f[Obi *et al.*, 2015½.

ÅpkÃ d :i e [kMh enk e ekik tkrk g] ftll Liu] Liu vfdEck] oÊVdy fxi dh igp ¼Åèokèkj idM dh igp½] vkyØ,uu dh ÅpkÃ] dkguh dh ÅpkÃ] gkFk dh yckÃ] dkguh fxi dh yckÃ] ij dh yckÃ vkj dk;kRed ij dh yckÃ dk dn d lkFk jf[kd lglcèk ¼r=0.70-0.98½ d lkFk dkQh vPNk FkkA Liu dk vU; ekin.Mk d chp vPNk lc/k Fkk ftld lkFk lkFk vdhEck] oÊVdy fxi dh igp] vkyØ,uu dh ÅpkÃ] dkguh dh ÅpkÃ] dkguh fxi dh yckÃ] lkeu d gkFk dh yckÃ vkj lglcèk d x.kkd d eku 0.65 l 0.82 rd d vrj d lkFk Hkh vPNk lglcèk FkkA

c½ dn d d;kRed d :i e fofHkUu ,FkkikefVd vk;kek d [kMh; vuikr

fp= e [kM vkj cB nkuk eæk e p;fur efgyk —f'k Jfedk d dn ¼H½ d dk; d :i e fofHkUu ,FkkikefVd MVk d 5th, 50th vkj 95th çfr"krrk [kMk dk Øe"k fp= 2 vkj 3 e n"kk;k x;k gA fp= 2 e ldfrd g fd [kMh enk e pÇunk fo'k;k d [kMh; vuikr vFkkr VkduVfjd ÅpkÃ] dkguh&dkguh dh pkMkÃ vkj fgi dh pkMkÃ 5th l 95th dn d çfr"krrk eY;k e of) d lkFk dkQh c< xÃA blh rjg] fp= 3 u ldr fn;k x;k g fd cBu dh eæk e p;fur fo'k;k d [kMh; vuikr e dèk dh yckÃ vkj cVd&ikiyhVy yckÃ dn e of) ¼5th l 95th çfr"krrk½ d lkFk c<h gA gkykfd] fo'k;k d dn e of) d lkFk "kjhj d vU; vk;kek d [kMk e dkÃ egRoi.k vrj ugÈ gA

l½ Hkkjr d jkT;k vkj vU; n"kk e ,FkkikefVd MVk dh ryuk

efgyk —f'k Jfedk d ldfyr ,FkkikefVd MVk ¼n=30½ dh ryuk Hkkjr d 15 jkT;k d vkdMk d lkFk dh xÃ vkj rkfydk 3 e çLrr dh xÃA rkfydk 3 l] ;g n[kk x;k fd Hkkjr d mÙkjh jkT;k fgekpy çn"k] itkc] tEe vkj d"ehj dh efgyk Ñf'k Jfed dk dn vè;;u e ,d= eè; çn"k dh efgyk —f'k Jfedk dh ryuk e yck gA gkykfd] mÙkj&ioÊ jkT;k dh efgyk Jfedk dh çfrek, vè;;u e p;fur Jfedk d dn l NkVh gA jktLFkku jkT; d fy, RSH eku 0.49 g tk n"kkrk g fd o Þyc ij okyÞ gA blh rjg] v#.kkpy çn"k jkT; d fy, RSH eku 0.53 g tk n"kkrk g fd o ÞNkV ij okyÞ gA ckdh jkT;k d fy,] RSH dk eku 0.50-0.52 d Hkhrj g] tk fd n"kkRkk g fd mUg NkV vkj yc ij d chp oxÊ—r fd;k tk ldrk gA

vè;;u e ,d= fd, x, ,UFkkikefVd MVk d vklr eY;k dh ryuk 14 n"kk dh efgyk Jfedk d ,UFkkikefVd MVk d lkFk dh xÃ Fkh vkj rkfydk 4 e fjikV dh xb gA ftll ik;k x;k g fd p;fur efgyk —'kd ;-,l-,-] ;-d-] g,yM] LohMu] ukbthfj;k] rkboku] phu] tkiku vkj dkfj;k dh efgykvk dh ryuk e NkV gA ,FkkikefVd MVk d chp ;g fHkUurk vU; n"kk d efgyk Jfedk d "kjhj fuek.k e vrj d dkj.k gk ldrh gA rkfydk 4 e if"peh vkj ,f"k;k&ç"kkr n"kk d vfèkdk"k efgyk Jfedk d fy, RSH dk eku 0.53-0.55 d Hkhrj vkr g tk fd ;g n"kkrk g fd mUg Þy?k ijÞ d :i e oxÊ—r fd;k tk ldrk gA ukbthfj;k l efgyk Jfedk d fy, RSH eku 0-48 g tkfd n"kkrk g fd o Þyc ij okyÞ gA tcfd] bfM;k] ikyM] bMkuf"k;k vkj fQfyfiuk dh efgykvk dk RSH eku 0.51-0.53 g vkj tkfd ;g n"kkrk g fd mUg NkV vkj yc ijk d chp oxÊ—r fd;k tk ldrk gA fofHkUu n"kk dh efgyk Ñf'k Jfedk d ,FkkikefVd MVk e cM cnyko ;g n"kkrk g fd fofHkUu n"kk d fy, fMtkbu vkj fodflr fd, x, —f'k midj.k vkj dk; LFky Hkkjrh; efgyk —f'k Jfedk d fy, mi;kx ugÈ fd, tk ldr gA ;g bl vkj bfxr djrk g fd y{; Jfedk d ,FkkikefVd vkdMk d vkèkkj ij —f'k midj.kk vkj dk; LFkyk d ,xkukfed fMtkbu dh vko";drk gA

fu'd'k

Hkkjr d eè; çn"k jkT; d Hkkiky fty d 22 l 54 o'k dh vk; d 30 efgyk —f'k Jfed p;fur dh xb ftud otu lfgr dy 38 "kkjhfjd vk;kek dk ekik x;kA dn dk vPNk lglcèk ¼correlation½ vfèkdk"k [kM vkj cB ekinMk cB yckÃ vkj gkFk vkj ij eki d chp n[kk x;k FkkA fofHkUu ,FkkikefVd vk;ke d chp lglc/k d x.kkd ¼0.65 l 0.98 rd½ fHkUu gkr gA dn d dk;kRed ,UFkkikefVd MVk dk [kMh; vuikr e] VkdUVfjd ÅpkÃ] dkguh&dkguh pkMkÃ vkj ikiyhVy dh pkMkÃ dk [kMh enk e vkj cBu dh eæk e dèk dh idM dh yckÃ vkj ikiyhVy dh yckÃ 5th l 95th çfr"krrk rd d dn dk ekiu d lkFk dkQh c< xÃA ;g crk;k x;k fd tc Hkkjr d fofHkUu jkT;k d ,FkkikefVd MVk d lkFk ifj.kkek dh ryuk dh xb] rk ,UFkkikefVd MVk e ,d fHkUurk ik;h

xbA p;fur efgyk –f'k Jfed fo'k; Hkkjr d mÙkj&ioÊ vkj ioÊ jkT;k d efgyk –f'k Jfedk dh ryuk e yc Fk] yfdu Hkkjr d mÙkjh jkT;k dh ryuk e de FkA blh rjg dh çofÙk "kjhj d vfèkdk"k vk;kek d fy; ikb xbA ;g n[kk x;k fd Hkkjrh; efgyk Ñ'kdk dk dn dk cB g, ,Økfe;u dh ÅpkÃ vkj dèk dh idM dh yckÃ] ;-,l-,-] fcfV"k] rdÊ] LohfM"k] ukb thfj;k] rkboku] phuh] tkikuh vkj dkfj;kÃ efgyk Jfedk dh ryuk e de gA Hkkjr dh efgyk –f'k Jfedk d ,UFkkikefVd vk;ke if"peh n"kk d ,Fkkike Vh vk;kek e cgr vrj g tkfd ,d fof"k'V ç–fr dk ldr djrk gA blfy, p;fur efgyk Jfedk d vu:lk –f'k midj.kk dk l"kkfèkr ;k iuZ fMtkbu dju dh vko";drk gA

InHk

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