

**PREVALENCE OF OBESITY AND METABOLIC SYNDROME IN THE
RURAL ADULT POPULATION: A DIAGNOSTIC STUDY FOR
INTERVENTION AND PREVENTION**

Executive Summary of Major Research Project

Submitted to University Grants Commission, New Delhi

(F.No.41-679/2012 (SR) 23.07.2012)



By

Dr. S.S. VIJAYANCHALI

(Principal Investigator)

Professor & Head

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The Gandhigram Rural Institute (Deemed to be University)

(Ministry of Education, Govt. of India)

Accredited by NAAC with 'A' Grade (3rd Cycle)

Gandhigram, Dindigul District

Tamil Nadu

ACKNOWLEDGEMENT

I wish to thank the University Grants Commission, New Delhi for the financial assistance to carry out this work (sanction letter: F.No.41-679/2012 (SR) 23.07.2012).

I am also very much grateful to the Authorities of The Gandhigram Rural Institute (Deemed to be University), Gandhigram for their encouragement and the infrastructure provided to me to complete the project successfully.

S.S. VIJAYANCHALI
(Principal Investigator)

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(from Two Expert)

UNIVERSITY GRANTS COMMISSION
BAHADUR SHAH ZAFAR MARG
NEW DELHI-110 002

**Proforma for Submission of Information at the Time of Sending the Final Report of the
Work Done on the Project**
Project Report **Final**

1. Name of the Principal Investigator : Dr. S.S. VIJAYANCHALI
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2. Dept. Of University/College : Department of Home Science
The Gandhigram Rural Institute-
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Gandhigram-624 302,
Dindigul District, Tamil Nadu.
3. UGC approval No. and Date : F.No..41-679/2012(SR)23.07.2012
4. Date of Implementation : 01/ 10/ 2012
5. Tenure of the project : 3 Years + 06 Months
6. Total Grant Allocated (in lakhs) : Rs. 11,60,800
7. Total Grant Received (in lakhs) : Rs. (7,21,800 + Received the letter of release
of 2nd Instatement for Rs. 2, 28,000/- but account
number was different Punjab National Bank
continuous letter is forwarded to UGC in this
regard)
8. Final Expenditure (in lakhs) : Rs.8,66,556)
9. Unspent Balance to be refunded to UGC : -

10. Title of the Research Project :Prevalence of Obesity and Metabolic Syndrome in the Rural Adult Population: A Diagnostic study for Intervention and Prevention

11. OBJECTIVES OF THE PROJECT

1. To appraise the prevalence and distribution of obesity and metabolic syndrome in the rural adult population in the selected region.
2. To recognize the factors contributing to Obesity and Metabolic Syndrome among the at-risk population.
3. To identify the health risks and problems related to obesity and Metabolic Syndrome among the at-risk population.
4. To design the intervention to improve the cognition level of the population on obesity and its management.
5. To suggest action plan to rectify and manage the problem of obesity with the focus to disseminate awareness among the population.

12. WHETHER OBJECTIVES WERE ACHIEVED (GIVE DETAILS) - YES

1. More than 3550 adults among rural mass/ population were assessed for identifying the people with obesity, hypertension, and diabetes and on the whole, with metabolic syndrome along with their socio economic status.
2. The allied health problems with respective causative and risk factors were collected from the respondents identified with metabolic syndrome and the associated factors were analysed.

3. Based on the gaps identified, an educational intervention module was developed and intervention was executed among the identified respondents with metabolic syndrome in order to disseminate knowledge among them, who volunteered.
4. The level of health risk was reduced and most of them had practiced and following the healthy dietary pattern as well as physical activity and were disseminating their knowledge on the importance of lifestyle modification to their family members and neighbours.
5. Regular health checkups were accepted by the rural mass as a mandatory one to be safe from the lifestyle disorders.

13. ACHIEVEMENTS OF THE PROJECT

1. Identified the prevalence and distribution of obesity and metabolic syndrome among the rural adult population in the selected region by using the criteria of WHO, NCEP, ATP and IDF;
2. Determined the dietary habit and physical activity (Lifestyle Pattern) followed by the rural at-risk population.
3. Assessed the associated health risks and problems of Obesity and Metabolic Syndrome prevailing among the at-risk population.
4. Designed intervention module and was successfully implemented among the volunteered women identified with obesity and metabolic syndrome.
5. Suggested, demonstrated and established plans to rectify and manage the problem of obesity and various health risks like diabetes, hypertension as they are the part of metabolic syndrome, with the focus to achieve good health in their family and propagate the health tips among the population.

14. SUMMARY OF THE FINDINGS:

Phase - I: A total of 3550 adult respondents in the age group of 18-60 years from 13 villages of two panchayats were assessed for metabolic syndrome by elucidating their socio-economic background. Among the total rural adults, males constituted 49.2% and the remaining 50.8% was by females. Majority of them (30.4%) were in the age-group of 21 – 30 years followed by 41 – 50 and 31 – 40 years age-group rural adults and their proportion in the total was 27.0% and 25.8% respectively and altogether constituted 83.2% in the total.

Vast majority (95.6%) of the rural adults were Hindus and the remaining 4.4% belong to Christianity. More than two-third (67.5%) of them belong to Backward Communities (BC) while another 23.8% in the total constituted by Scheduled Communities (SC) whereas the rest (8.6%) in the total were from Most Backward Communities (MBC). Of the total respondents, two-fifth (40.4%) of them have studied upto Secondary School, while another one-fifth (21.1%) in the total have completed Primary education whereas 14.1% of the total population were found as illiterate respondents. Women purchased Higher Secondary, Graduation and Diploma level education have constituted the remaining of the total and their respective proportion in the total was 10.2%, 12.7%, and 1.5%.

A significant majority (35.5%) of them were found as Unemployed while another 29.8% of the total were involved in Agriculture whereas another one-fourth (24.9%) of the total were working as Daily Wagers and the employees in Private sector have constituted 4.4% in the total. An equal proportion (2.7%) of the total was constituted by Government employees and Self-Employed whereas more than half (54.2%) in the total

of female respondents were Home Makers/unemployed. Majority of the respondents were married, irrespective of sex, followed by unmarried (11.4%), Widow (6.2%), and Divorced / Separated (1.4%). Majority of the respondents hailed from nuclear families and two-third (66.9%) of them belongs to small families which included a maximum of four members.

Of the total respondents 41.5% of them were identified with Normal (18.5 to 22.9) Body Mass Index (BMI) followed by 26.5% of Overweight (23 to 24.9) and 24.1% of Obese I (25 to 29.9) respondents. Both Underweight (< 18.5) and Obese II (≥ 30) respondents have constituted an equal proportion (3.9%). Overweight, Obese I, Obese II and Underweight have constituted 29.8%, 22.7%, 4.4%, and 2.6% respectively in the total of males whereas it was 23.2%, 25.6%, 3.3%, and 5.2% respectively in the total of females.

Large majority (81.3%) of the total respondents' Waist Circumference was 'At-risk' while the respondents identified with 'Normal' Waist Circumference have constituted the remaining 19.3% in the total. It is found that their Waist Circumference was influenced by their sex as majority in the total of females were identified with 'At-risk' Waist Circumference compared to males.

More than half 51.8% of them were identified with 'At-risk' Waist-Hip Ratio (WHR) while the remaining 48.2% in the total were with Normal WHR. While majority (95.1%) in the total of males were identified with 'Normal' WHR 97.2% in the total of females were identified with 'At-risk' WHR whereas the respondents with 'Normal' WHR have constituted only 2.8% in the total of females while the respondents with 'At-risk' WHR have constituted only 4.9% in the total of males.

Majority (70.4%) of the respondents were identified with 'Normal' Blood Pressure level while the respondents identified with 'Prehypertension' (120-139/80-89) have constituted about one-fourth (24.5%) in the total whereas Hypertension Stage 1 (140-159/90-99), and Hypertension Stage 2 ($\geq 160/\geq 100$) respondents have constituted the remaining in the total and their respective percentage in the total was 4.5, and 0.6. It would be note worthy to state that of the total adult-respondents about three out of ten was identified with Prehypertension, Hypertension Stage I or Hypertension Stage II.

About 72% of the respondents had normal fasting blood glucose level while another 26.2% were found as Diabetes (≥ 126 mg/dl) whereas the remaining (1.9%) of the total was constituted by 'Pre-Diabetes' respondents. In other words, three out of ten adult-respondents included in the present study were as 'Pre-Diabetes' or 'Diabetes'.

Vast majority (92.3%) of the total adult-respondents included in the present study were free from the prevalence of metabolic syndrome while the remaining (7.7%) respondents were identified with metabolic syndrome. Majority (93.3%) in the total of male and female (91.4%) respondents were not with metabolic syndrome whereas it was prevalent in the remaining 6.7% in the total of males and 8.6% in the total of females.

The Mean score of the respondents' Anthropometrical assessment viz., BMI, WC, and WHR was 23.8 to the females and 23.3 to males. As far as the Mean score for WC is concerned it was found that the males' Mean WC was 92.1 whereas 89.1 stood as the Mean for females. While considering the Mean for WHR, it was calculated that 0.9 as the Mean for both sexes.

It was found that the respondents' BMI, WC, WHR, Blood Pressure, fasting blood glucose i.e. diabetes was significantly influenced by their age and sex. It would be stated

that the metabolic syndrome is more prevalent with the advancement of age in both sexes.

Educational level has a greater significance in their BMI. It was proved through the study that the BMI was Normal in the adults reached higher education. Adults identified of either Pre-hypertension, Hypertension I or Hypertension II, Pre-Diabetes or Diabetes were with low educational status.

The risk of high WC was higher among the 'normal' persons (67.1% in males and 70.0% in females) than persons with hypertension. The risk of WC was comparatively higher among the persons with diabetes (24.0% in males and 20.0% in females) compared to the persons with pre-Diabetes (7.9% in males and 7.4% in females).

The risk of WHR was comparatively higher among the male adults with pre-hypertension (46.0%) than in male with high Blood Pressure. The risk of WC was comparatively higher among the persons with diabetes (42.4% in males and 19.2% in females) compared to that persons with pre-Diabetes (6.0% in males and 8.0% in females).

Phase - II: From the Phase – I, screening was done and 272 adult respondents (118 male and 154 female) were identified with Metabolic Syndrome (MS) based on WHO, NCEP, ATP and IDF criteria. Majority (44.0%) of the male adult-respondents included in Phase II of the study belongs to 48-57 years age-group and 40.3% in the total of female respondents were in 38 – 47 age-group. Half (50.0%) of them were from Backward Communities, followed by SC (44.5%) and MBC (5.5%) respondents. Majority of the rural adult-respondents, irrespective of sex, with Metabolic Syndrome

have studied up to Secondary School education, were married, hailed from nuclear family, involved in agriculture and allied activities.

The respondents' metabolic syndrome viz., BMI, WHR, BP, FBG, Body Fat distribution, Skeletal Muscle, Trunk Fat, Arm Fat, and Leg Fat distribution were assessed and hence it was found that majority in the total males were identified as Obese compared to females; majority female respondents were identified with 'at-risk' WHR; irrespective of sex, majority of them were identified of Pre-Hypertension through their blood pressure level; fasting blood glucose level was 'at risk' with diabetes; one-fourth of their skeletal muscle distribution was 'above 28%' i.e. 'at-risk'; and the assessment of trunk fat distribution, leg fat distribution, and arms fat distribution indicated that majority of them were at-risk'.

The dietary factors of adult respondents with metabolic syndrome reveals that large majority of them, irrespective of sex, were non-vegetarian; followed three meals pattern per day; and did not skip their meals. About two-fifth of both male and females with Metabolic Syndrome have preferred to eat away from home either once in a day or week.

Majority of the adult-respondents with MS were sedentary workers; one-third of them were from obese family background; became obese during their adolescent period; and were affected with diabetes and hypertension. It is important to mention here that both diabetes and hypertension are the conditions of metabolic syndrome. Nearly two-fifth (40.0%) of them who were identified newly through this research work with metabolic syndrome do not know that they are prone to any one conditions of MS. Majority (85.7%) of them, irrespective of sex, had health problems like joint pain, leg

pain, body pain, and back pain and besides were suffering of stress / strain, fatigue, and ulcer.

Scientific knowledge is required as a basic requisite that may lead to changes in their practice. Hence, a location specific educational programme with easy and scientific explanations for improving the cognition level of the target group was developed which in turn, will help in modification in their lifestyle with a focus on their dietary changes and improvement in their activity pattern to improve their health.

Phase – III: On educational intervention, significant changes was noticed with a significant reduction at 1 percent level in the Body Mass Index, Waist Circumference and Fasting Blood Glucose, Systolic and Diastolic Blood Pressure. And there was no significant change in Total Cholesterol, Triglyceride, High Density Lipoprotein and Waist Hip Ratio.

15. CONTRIBUTION TO THE SOCIETY

Rural population do not give much importance to their health or take care of health by following a good dietary pattern with balanced diet as well being physically active to be free from health problems.

Even they were not much aware of the basic facility available for them either in PHC or Government hospitals where they can go for regular health checkups and the information were disseminated.

Educational Intervention developed for women with metabolic syndrome like assessing their anthropometric levels by themselves, know the (cut-off) risk level of hypertension and diabetes, planning and preparing their diet with locally available foods rich in fiber, restricted in calories and fat, at least 20 minutes of being physically active in

a day have reduced the risk level in them and also brought positive changes in the eating habits of their family members by executing what they have learnt and this information was passed to the community and the nearby families also started to adopt the dietary changes and physically active. Hence, with the help of the developed educational intervention module, changes can be made in other region especially among rural population by adapting the methods to improve the cognition level of women which will help to impart the ways to stay healthy and free from metabolic syndrome.

16. **WHETHER ANY PH.D. ENROLLED:** Yes

17. **Ph.D PRODUCED OUT OF THE PROJECT:** NIL

18. **NO. OF PUBLICATIONS OUT OF THE PROJECT:** 03

(PRINCIPAL INVESTIGATOR)

(REGISTRAR)

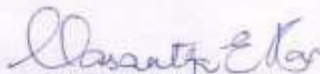
**UNIVERSITY GRANTS COMMISSION
BAHADUR SHAH ZAFAR MARG
NEW DELHI-110 002**

EVALUATION CERTIFICATE

It is certified that the report entitled "**Prevalence of Obesity and Metabolic Syndrome in the Rural Adult Population: A Diagnostic study for Intervention and Prevention**" by Dr.S.S.Vijayanchali, Associate Professor and Head, Department of Home science, The Gandhigram Rural Institute – Deemed to be university, Gandhigram has been evaluated to the University Grants Commission, New Delhi for final submission of the report to UGC, New Delhi under the scheme of Major Research Project (F.No.41-679/2012(SR)).

Details of Expert Committee

The objectives mentioned in the proposal were completed satisfactorily. The results are published in peer reviewed International / Journals. Overall, the outcome of the Research project is good. The report is as per the guidelines.


Signature with seal

Dr. Yashanti Esther Rani
Associate Professor & Head
The Research Centre of Home Science
Punjab College (Autonomous)
Madurai - 625 015

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whh bb wmb

Signature with seal

முனைவர் ஸ்ரீ. கவிதா மணிகர்வரி
துணைத்தலைவர்
மனைப்பலப் துறை
ஆர்தி மகலிர் கலை, கல்துணி
பெண்.க. - 114 20, நேர்யல் கலை

The Gandhigram Rural Institute (Deemed to be University)
 Gandhigram - 624 302
UGC-MRP Project on "Prevalence of Obesity and Metabolic Syndrome in the Rural Adult Population: A Diagnostic Study for Intervention and Prevention"

University/Institution : Dr.S.S.Vijayanchali, Principal Investigator
 : The Gandhigram Rural Institute (Deemed to be University) Gandhigram-624 302
 Sanction Letter No. and Date of UGC, New Delhi : F.No-41-679/2012/(SR),dt: 23.07.2012
 Statement of Actual Expenditure during : 24.09.2012 to 31.12.2015

Item of Expenditure	Total Grant approved	Actual Grant Received					Total (3 to 6)	Actual Expenditure incurred					Total (8 to 11)	Excess/Saving diff. of Co.7 & 12
		2012-13	2013-14	2014-15	2015-16	2015-16		2012-13	2013-14	2014-15	2015-16			
(A) Non-Recurring	2,00,000	-	-	-	-	2,00,000	0	1,79,999	-	-	1,79,999	20,001		
1. Equipment	2,00,000	-	-	-	-	2,00,000	0	1,79,999	0	0	1,79,999	20,001		
Total (A)														
(B) Recurring (Per Annum)	4,80,000	-	-	-	-	2,64,000	84,000	1,68,000	1,80,000	48,000	4,80,000	-2,16,000		
1.Honorarium	1,00,000	-	-	-	-	50,000	0	19,150	20,250	10,600	50,000	0		
2.Chemicals	50,000	-	-	-	-	25,000	6,163	40,297	19,138	5,000	70,598	-45,598		
3.Contingencies	1,50,000	-	-	-	-	75,000	0	40,275	54,000	94,275	-19,275			
4.Hiring Services	50,000	-	-	-	-	25,000	1,883	24,031	570	18,850	45,334	-20,334		
5.Travel/Field work	82,800	-	-	-	-	82,800	82,800	-	-	-	82,800	-82,800		
6.Overhead charges	9,12,800	0	0	0	0	4,39,000	92,046	3,34,278	2,60,233	1,36,450	8,23,007	-3,84,007		
Total (B)														
Total (A) + (B)														
Interest on Grant received	11,12,800	9,973	20,178	3,033	267	33,451	0	0	0	0	0	33,451		
Total														
Unspent Balance	11,12,800	7,31,773	20,178	3,033	267	7,55,251	92,046	5,14,277	2,60,233	1,36,450	10,03,006	-2,47,755		

Total Grant received with interest : 7,55,251
 Less: Expenditure : 10,03,006
 Unspent Balance as on 31.12.2015 : -2,47,755

Certified that the grant has been utilized for the purpose for which it was sanctioned and in accordance with terms and conditions

(Signature)

Dr. (Mrs). S.S. VIJAYANCHALI, M.Sc., Ph.D.,
 Associate Professor & Head
 Department of Home Science
 The Gandhigram Rural Institute
 (Deemed to be University)
 Gandhigram - 624 302
 Tamil Nadu

Special Officer (Finance)
 Gandhigram Rural Institute

(Signature)

REGISTRAR
 Gandhigram Rural Institute



For S.S.&Co
 Chartered Accountants

(Signature)

S.Srinivasan Partner
 FRN 003502S / Mem.No 024142