

MASTER OF PUBLIC HEALTH

Johns Hopkins Bloomberg School of Public Health & IIHMR University

PRACTICUM REPORT

By

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Cohort-7

2019 – 21

Under the Guidance of

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&

Dr. Rajesh Singh (Preceptor Name)

Chief Functionary, Garhwal Community Development & Welfare Society

TO WHOMSOEVER MAY CONCERN

This is to certify that Parul Singh, student of Master of Public Health Program offered by IIHMR University, Jaipur in cooperation with Johns Hopkins Bloomberg School of Public Health, Baltimore has undergone Practicum Training at Garhwal Community Development & Welfare Society from 15 December 2020 to 15 March 2021.

The Candidate has successfully carried out the study designated to her during practicum training and her approach to the study has been sincere, scientific, and analytical.

The Practicum Training is in fulfilment of the course requirements.

I wish her success in all her future endeavours.

Dr Daya Krishan Mangal,

Dean Researcher and Professor IIHMR University

IIHMR University, Jaipur

CERTIFICATE BY SCHOLAR

This is to certify that the Practicum Project titled submitted by me, Parul Singh with Enrolment No. under the supervision of Dr Daya Krishan Mangal for award of Master of Public Health carried out during the period 15-December-2020 to 15-March-2021 embodies my original work and has not formed the basis for the award of any degree, diploma associate ship, fellowship, titles in this or any other Institute or other similar institution of higher learning.

Dr Parul Singh
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Certificate from the organization



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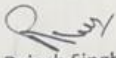
TO WHOSOEVER IT MAY CONCERN

This is to certify that Dr Parul Singh student of Master of Public Health (MPH) offered by IIHMR University, Jaipur in cooperation with the John Hopkins Bloomberg School of public health, USA has undergone practicum training/internship at Garhwal Community Development and Welfare Society from 15th December 2020 to 15th March 2021 for the study "Prevalence of Diabetes and Pre-Diabetes in rural Uttarakhand-India"

Dr Parul has successfully carried out the statistical analysis of the above study designated to her during practicum training under the guidance of Dr Rajesh Singh Principal Investigator at Garhwal Community Development and Welfare Society and Dr Daya Krishna Mangal, Dean and Professor at at IIHMR University Jaipur Rajasthan.

As a part of her internship, she has been exposed to various activities and has been involved in preparing a brief on field work, Data Collection, Data Entry, Analysis and Report generation.

We found her to be an intelligent and hardworking professional with a good conduct. We wish her all the best in her future endeavours


Dr Rajesh Singh (MBBS/MS)
Chief Functionary
Garhwal Community Development
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ABOUT THE ORGANIZATION

Vision: Garhwal Community Development and Welfare Society (GCDWS) is striving to distinguish itself as a pioneer in redefining health care delivery by providing quality and innovative health care to the community it serves primarily for the vulnerable group. We want to be recognized for our passion for the well-being of the community.

Mission: To provide quality and innovative health care to enhance the health of the community in the Garhwal region, through research, training that includes skill development and health education to improve their health, providing clinical health services at a minimal cost, irrespective of caste, creed, gender, age, and religion.

Goal: To improve the community's health and well-being it serves through research, training, and health care delivery.

Objectives:

- To conduct skills development and health training to improve the community's health by 25% by 2030.
- To achieve a better quality of life and overall well-being of the community.
- To conduct research in improving the health and health services of the community.

Values:

- The organization strives to put the health interests of the community first.
- The organization aims to continuously improve in terms of providing health services and research.
- We work together with respect and integrity.

ABOUT THE PROJECT

Project title: Prevalence of Diabetes and Pre-diabetes in rural Uttarakhand, India.

Research Question:

1. What is the prevalence of diabetes and pre-diabetes among the age group 40-70 in rural Tehri Garhwal Uttarakhand?
2. What are the barriers, such as access to services, costs, and lifestyle, to appropriate management of people with diabetes and pre-diabetes living in rural India?

Aims and Objectives:

- The primary objective of this study is to understand the prevalence of Diabetes and Pre-diabetes in Rural Uttarakhand, India.
- To assess the drug compliance of the old diabetic population.
- To determine barriers (such as cultural beliefs, awareness, access to services, costs, lifestyle, and sex-specific barriers) to effective management of people with diabetes and pre-diabetes.

PRACTICUM LEARNING OBJECTIVES AND RESPONSIBILITIES

- 1) **ANALYTICAL SKILLS:** To obtain data and interpret data to assess the prevalence of diabetes and pre-diabetes. Identify the importance of data in shaping public health issues.
- 2) **BEHAVIOUR AND COMMUNICATION:** Utilized learning skills to communicate with a variety of stakeholders and communication with the people with a questionnaire containing the particulars like social and demographic factors as well as their dietary, lifestyle and health-related information.
- 3) **RELATIONSHIP BUILDING:** rapport building with the people, performing interviews with the people coming for testing of blood sugar levels.
- 4) **TIME MANAGEMENT:** appropriate share time is given to each person participating in the questionnaire.
- 5) **PUBLIC HEALTH SCIENCE SKILLS:** Utilized public health assessment tools to assess health status.

MY SPECIFIC TASK AND RESPONSIBILITIES UNDER THE PROJECT

- 1) To determine the prevalence of diabetic and prediabetics, and to determine barriers (such as cultural beliefs, awareness, access to services, costs, lifestyle, and sex-specific barriers) to appropriate management of people with diabetes and pre-diabetes in the rural area of Uttarakhand.
- 2) To assess drug compliance of old diabetic patients
- 3) To collect data until the desired sample size is achieved.
- 4) To create patient information, an excel sheet which will cover all the necessary information, vitals as blood sugar levels.

Background

Around the world, diabetes is one of the major contributing factor for morbidity and mortality.(1) The prevalence of diabetes and pre-diabetes is an increasing concern for public health in India. More than sixty nine million people with diabetes are estimated to increase to eighty million by the year 2030.(2) In India, the prevalence of diabetes and pre-diabetes is rising rapidly. It is predicted to exceed 100 million by 2030.(3) India is home to sixty-nine million one hundred thousand people with Diabetes mellitus, the second-highest number of cases following China.(4) The prevalence of diabetes was estimated to affect 2.8 percent of the world's population in the year 2000 and 4.4 percent by the year 2030.(2) Majority of the data available on the prevalence of diabetes mellitus in India come from populations of urban India or southern regions.(5) However, very little is known about north India's hilly areas where poverty and lack of access to healthcare services may have worsen the problem. HbA_{1c} is becoming the preferred test for the diagnosis of diabetes mellitus. HbA_{1c} has been recommended by the American Diabetes Association to be used as a substitute for fasting blood glucose for diagnosing diabetes.(6) As efficiency increases in the production of HbA_{1c} which would reduce cost and increase production in India, it is anticipated that HbA_{1c} will be used more frequently for the diagnosis of Diabetes Mellitus. In the context of North India, it is unclear how well this test will perform.(7) Diabetes is considered to be among the most psychological and behavioral demands of chronic diseases and needs constant self-monitoring of blood glucose, dietary modification, diet, and schedule medication. Non-adherence to medication is frequent among people with diabetes and is one of the key challenges to public health. In a developing country like India with low levels of literacy and limited access to healthcare facilities, the prevalence of noncompliance with drugs is more common.(8) The worldwide increase in the prevalence of diabetes is due to massive population growth, ageing, urbanization, increased obesity and lack of physical activity. The significant determinants of this epidemic are rapid epidemiological transitions related to dietary habits and sedentary behavior changes. Diabetes is among the fastest-growing chronic diseases and a significant public health problem around the world. The global burden of diabetes is rapidly increasing worldwide. According to the 2019 International Diabetes Federation (IDF) report, approximately four hundred and sixty-three million adults (20-79 years of age) have diabetes. This age group accounts 9.3% of the world's population.(9) Poor compliance is a key consideration to adequate control of blood sugar levels among those diagnosed with diabetes. Noncompliance with medication is considered to be the most common cause of treatment failure. Failure to comply leads to

a lack of metabolic control, contributing to the development and acceleration of diabetic complications.(10) Medication noncompliance is associated with poor glycemic control, increased use of health-care resources, higher health costs, and higher mortality rates.

Methodology

There are 103 Gram Sabha in Chamba block. Initially we developed two strata depending on the distance from GCDWS head office. Strata A comprised of fifty-seven villages which were within 15 km radius from GCDWS office and strata B comprised of forty-six villages which were not within the 15 km radius from GCDWS office. Randomly three villages were selected from fifty-seven villages located within 15km radius from GCDWS head office in Tehri district in Uttarakhand's Garhwal region using random number generation method using excel. Prior to conducting the baseline survey, a stakeholder meeting was conducted with Pradhan, ASHA, ANM and other influential people of the three villages for the goal and objective of the study and to get acceptance/permission while conducting the survey in their respected village. A population-based study was performed in these three villages that were randomly selected in Tehri Garhwal, which are Sangoan, Silkotee and Pursolgoan. A cross-sectional survey of adults was conducted in each village for around 15 days, with the focus of obtaining approximately seventy participants per village. The study was carried out to calculate the prevalence of diabetes mellitus in a rural community by health camp and door to door approach. A household survey tool was developed and piloted with relatives of patients that came to the hospital (Christian Hospital Chamba). A household survey was done in the three villages. After conducting the household survey, 220 participants of age 40 to 70 were included in the study. Anthropometry, questionnaire, and blood samples for HbA1c were taken from the selected 220 participants. The diabetes prevalence assessment tool collected data on household, type of family, family history of diabetes mellitus, family medical history of chronic diseases, income, and individual information such as gender, gender, education, occupation, and type of food, diet, and lifestyle habit. To assess the compliance of antidiabetic drugs, data was collected with a structured questionnaire. The questionnaire was filled by the old diabetic patients. The families were informed and encouraged to participated in the study. The purpose of the study was explained to all participants, and strict confidentiality was guaranteed. Participants were given the option of opting out of the study if they so desired. HbA1c measure was carried out by a HbA1c analyzer in the laboratory in Christian Hospital Chamba, Tehri Garhwal.

Data collection and statistical analysis

All the data entries were done in excel. Cleaning and analysis along with reporting was done in statistical tool, SPSS.

Clinical Definition

Diabetes was defined as according to the cut points established by the American Diabetes Association. Participants with HbA1c 4 to 5.6 were defined as normal or no diabetes, HbA1c of $\geq 5.7\%$ to 6.4% were classified as prediabetic, and those with HbA1c $\geq 6.5\%$ were classified as diabetic.

Justification of Age

The probability of dying from one of the four major NCDs between the ages 30 and 70 by WHO region as in the "Global Status Report on noncommunicable diseases" is shown in the figure. This probability varied by region, ranging from 15% in the Region of the Americas to 25% in the South-East Asia Region. (11)

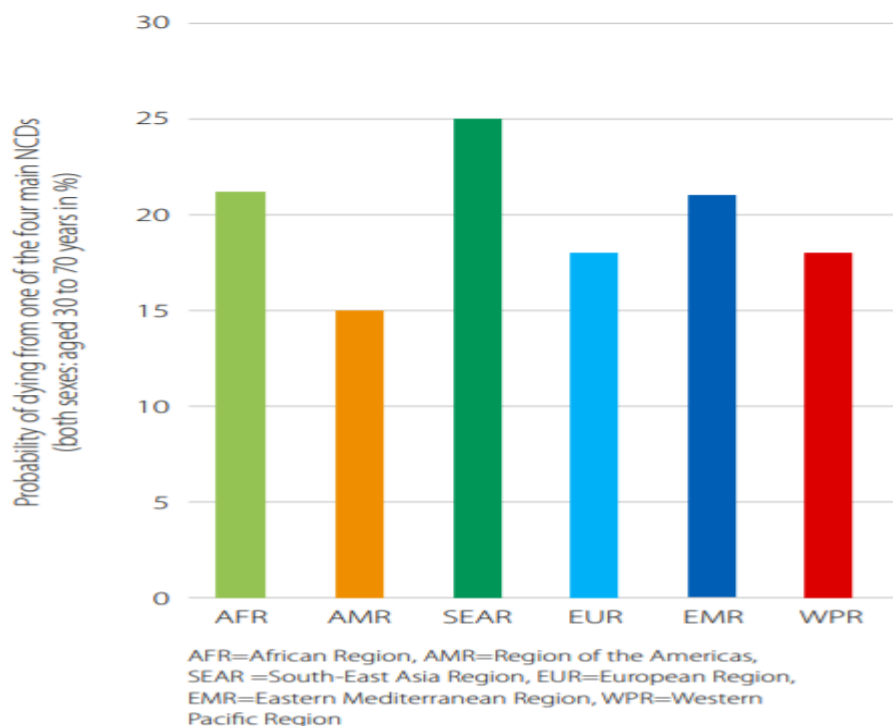


Figure 2.1, Source: WHO - Global Status Report on noncommunicable diseases

The probability of dying from cardiovascular diseases, cancer, chronic respiratory diseases and diabetes in the population aged 30 to 70 years in India is more than 25%, i.e., 26.2%.(11)

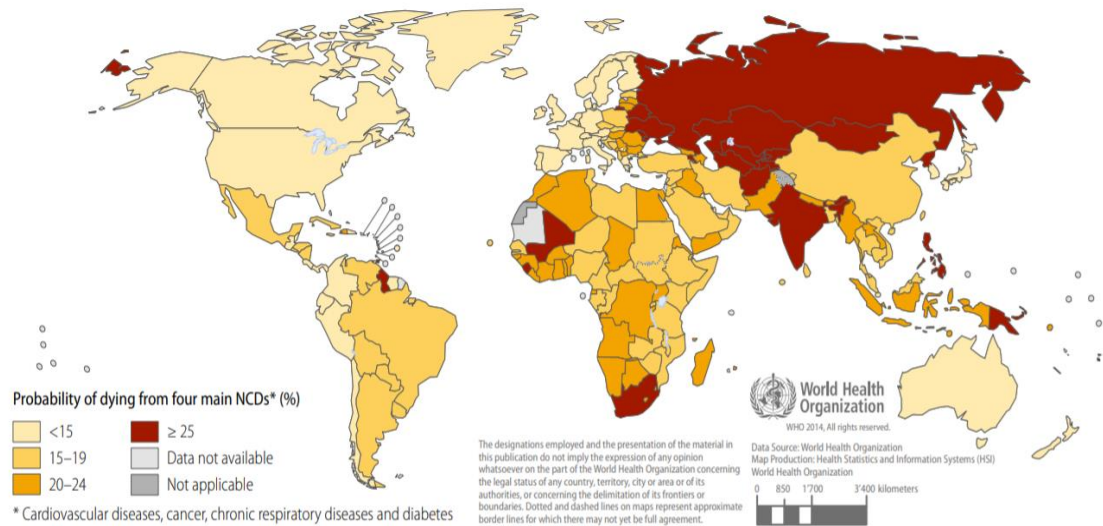


Figure 2.2, Source: WHO - Global Status Report on noncommunicable diseases

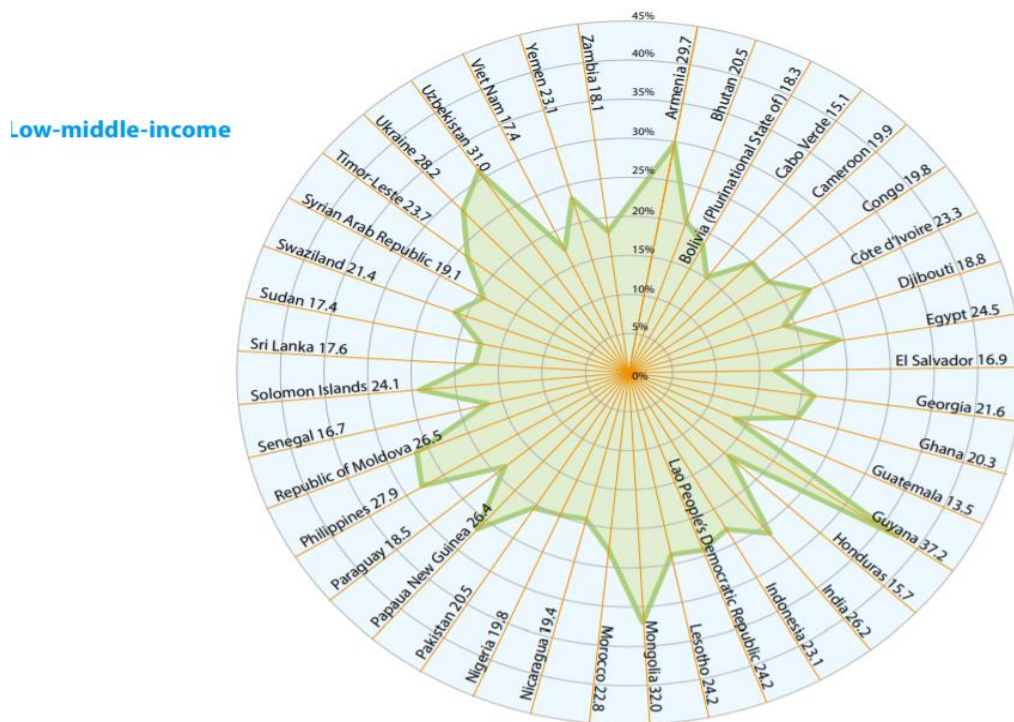


Figure 2.3, Source: WHO - Global Status Report on noncommunicable diseases

Justification of sample size

10% of age group 40 to 70 years have been taken as the sample in the study by sample random sampling method. Population information for the selected villages have been taken from accredited social health activist (ASHA) of the village. (Table 2.1)

Village	Total Population	Total Population age group 40-70 years	10% (Sample Size)
Pursolgoan	1900	760	76
Silkotee	1829	731	73
Sangoan	1779	711	71
Total	5508	2202	220

Table 2.1

Ethical Approval

Ethical approval was taken from the organization GCDWS, an informed consent was also taken from every participant before starting any data were collected. The nature and purpose of the study was explained to the participants. Confidentiality was assured to all the participants.

Result

Prevalence of diabetes in rural Garhwal

The statistical result was estimated by IBM SPSS Statistical 22. The study sample size was 220, among which 104 (47.3%) were female, and 116 (52.7%) were male (Table 3.1). The mean age of the participants was 53.19. We conducted a chi-square test for gender and HbA1c. the value for chi-square statistic is .281 and the p-value was .869 (Table 3.2). Since the p-value is greater than .05 is not statistically significant and indicates that there is no association between gender and diabetes.

HbA1C * SEX Crosstabulation

		SEX		Total
		FEMALE	MALE	
HbA1C	normal	39	45	84
	Prediabetic	48	55	103
	Diabetic	17	16	33
Total		104	116	220

Table 3.1

Chi-Square Tests for HbA1C * SEX Crosstabulation

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.281 ^a	2	.869
Likelihood Ratio	.280	2	.869
Linear-by-Linear Association	.169	1	.681
N of Valid Cases	220		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 15.60.

Table 3.2

Using the HbA1c test, the participants' crude prevalence of pre-diabetes and diabetes was determined. Based on HbA1c levels, the overall prevalence of diabetes was 15% (33/220) and pre-diabetes 46.8% (103/220) among the study population. (Table 3.3) Out of the 33 diabetics, only six people go for regular health check-ups, and three had visited the health facility for blood sugar check-up within one year. The remaining 24 did not visit the health facilities unless they feel the need to visit. Of the 103 prediabetics, 23 were diagnosed with diabetes earlier.

		HbA1C			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Normal	84	38.2	38.2	38.2
	Prediabetic	103	46.8	46.8	85.0
	Diabetic	33	15.0	15.0	100.0
	Total	220	100.0	100.0	

Table 3.3

Chi-square test between age and HbA1c had a p-value of .021 since the p-value less than 0.05, and it is statistically significant. It indicates strong evidence that there is a relationship between age and HbA1c status. Prevalence of pre-diabetes and diabetes was found to be lower in the younger age groups as compared to the older age group.

HbA1C * AGE Crosstabulation

		AGE			Total
		40-49	50-59	60-70	
HbA1C	Normal	40	31	13	84
	Prediabetic	32	41	30	103
	Diabetic	7	14	12	33
Total		79	86	55	220

Table 3.4

The burden of Undiagnosed Diabetic Mellitus Population

The overall prevalence of the undiagnosed diabetic population in our study was 36.4% (12). The prevalence of males was higher than female for the undiagnosed cases, i.e., 58.3% were male and 41.6% in female. These people have high glucose levels but were unaware of their diabetes status. The most common cause for undiagnosed diabetes was associated with not getting regular check-ups to get diabetes checked. Regular check-up means every six month. Out of twelve new diabetic cases, eight did not go for regular blood glucose check-ups, and only four when for check-ups sometimes.

Disease Burden of undiagnosed Diabetes Mellitus Cases

		Frequency	Percent	Prevalence	Cumulative Percent
Valid	Old Diabetic	21	63.6	63.6	63.6
	New Diabetic	12	36.4	36.4	100.0
	Total	33	100.0	100.0	

Table 3.5

New Cases * AGE Crosstabulation

Count

		AGE			Total
		40-49	50-59	60-70	
New Cases	Old Diabetic	3	11	7	21
	New Diabetic	4	3	5	12
Total		7	14	12	33

Table 3.6

New Cases * Gender Crosstabulation

Count

		Gender		Total
		Male	Female	
New Cases	Old Diabetic	11	10	21
	New Diabetic	7	5	12
Total		18	15	33

Table 3.7

Relationship between Diabetes mellitus and Family history of diabetes mellitus

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	17.275 ^a	4	.002
Likelihood Ratio	17.571	4	.001
Linear-by-Linear Association	9.223	1	.002
N of Valid Cases	220		

(a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 9.60.)

Table 3.8

Chai-sq test was done to observe the relationship between diabetes mellitus and family history of diabetes mellitus. The p-value is 0.002, so we will accept the alternative hypothesis that there is a significant association between Diabetes Mellitus and family history of diabetes mellitus.

Drug Compliance

The drug compliance was done with the old diabetic patients. Out of a total of thirty-three Diabetic cases, twenty-one were Old diabetic cases, whereas twelve were newly diagnosed in this survey. Out of twenty-one old diabetic cases, only eight, i.e., 38%, were compliant to medication, and 62% were non-compliant to medication.

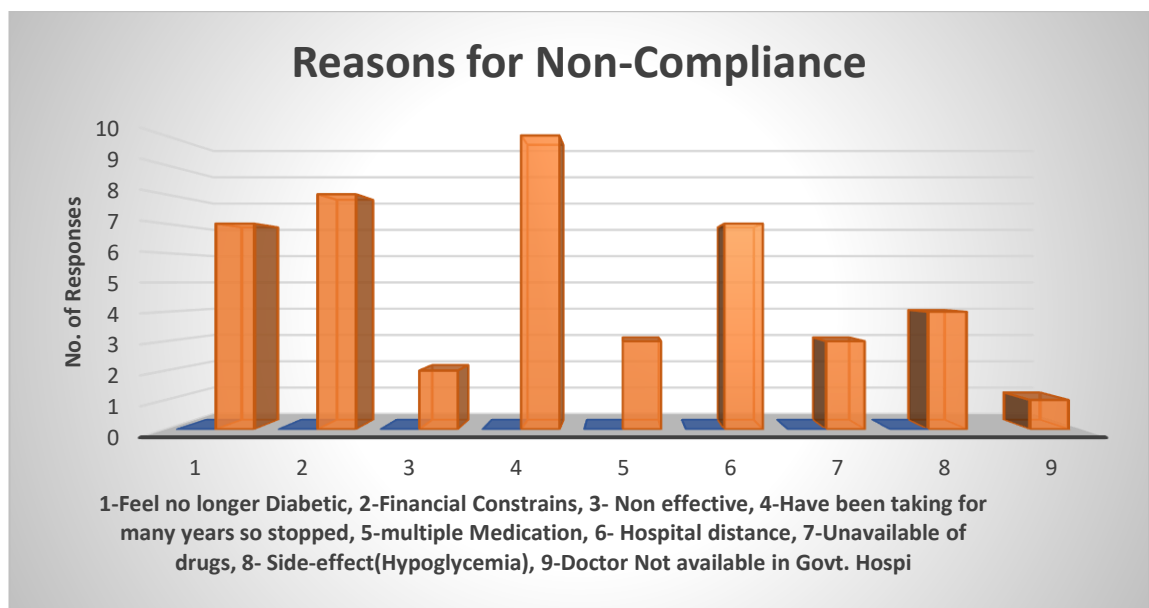


Figure 3.1

The compliance with drugs was significantly lower in those that had diabetes for five years or more. The compliance was lower in females; 33.33% of females did not comply

with the treatment as compared to males, which was 28.6%. The most significant reason for non-compliance with antidiabetic medication was the long duration of treatment that led the participants to stop taking the medication, which was 22.22%. The second very significant reason for noncompliance with antidiabetic medication was financial constraints which were 17.8%.

GENDER * MEDICATION
Crosstabulation

Count

GENDER	MEDICATION		Total
	yes	no	
male	5	6	11
female	3	7	10
Total	8	13	21

Table 3.9

Reasons for noncompliance of antidiabetic medication	%
Feel no longer have DM	15.55
Financial Constrains	17.77
Medication Non-effective	4.44
Long duration of treatment	22.22
Multiple medication of illnesses	6.66
Distance of hospital	15.55
Non-availability of medicines	6.66
Frequent side-effects	8.88
Doctor not available	2.22

Figure 3.2

Limitations

As this was a practicum project for a follow-up study could not be done due to limitations in time. There was self-reporting of the compliance of medication by the participants, so they can be a chance of overreporting. Due to limited resources a small sample size was taken which was another limitation to the study. As the subgroup analysis is of a limited sample size so it may not accurately be represented to the entire population.

Discussion

HbA1c has been used in very few studies for the diagnosis of Diabetes Mellitus in India, and this is one such study conducted in the remote communities residing in the hilly region of Northern India. In most societies, there is a limited knowledge (or lack of awareness) about the effectiveness of changing lifestyle habits in diabetes prevention and management of diabetes. The ideas, beliefs, and experiences of the patients of diabetes also have a major impact on compliance with medication. 15.55% of the participants expressed that they were feeling better and did not feel the need to further continue the antidiabetic medications that were prescribed to them. They did not consult any doctor before they themselves stopped taking the medicines. 4.4% of the participants mentioned that the medicines were non-effective and that every time they got their sugar levels checked there was no difference, so they stopped taking the medicines prescribed to them by the doctor. The average age of working population in India is 15 to 59 years of age. Those that are of the age 60 and above are dependent on their children or government for

their expenses. Hence, the elderly age group i.e., 60 and above face financial constraints on transportation expenditure, mediational expenditure, and hospital expenditure. The non-compliance of medication in this study was found to be sixty two percent. A similar study to assess the non-compliance of medicine was conducted in Tamil Nadu in the year 2018 and the drug compliances was found to be forty six percent.(12) The prevalence of diabetes was 15 percent in adults whereas as per National Family and Health Survey the prevalence of diabetes in rural india in adults is 5.5 percent .

Conclusion

The Prevalence of diabetes was fifteen percent in this study. There was a remarkably high prevalence of diabetes and pre-diabetes, indicating the need for additional diabetes mellitus research, including the identification of key causal factors of diabetes and pre-diabetes in the mountainous areas of Northern India.

Abbreviations

HbA1c: Glycated hemoglobin, ANM: Auxiliary Nursing Midwifery, ASHA: Accredited Social Health Activist, GCDWS: Garhwal Community Development and Welfare Society, DM: Diabetes Mellitus, NCD: Non-Communicable Diseases, WHO: World Health Organization.

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