ISSN- O: 2458 - 868X, ISSN–P: 2458 – 8687
National Library of Medicine - ID: 101731606

International Journal of Medical Science and Innovative Research (IJMSIR)
IJMSIR : A Medical Publication Hub
Available Online at: www.ijmsir.com
Volume – 9, Issue – 1, January – 2024 , Page No. : 14 – 21

A study for early risk assessment of Lipid Abnormalities in diabetic and non-diabetic patients in a Tertiary care centre in North India- A Cross sectional study

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Citation this Article: Dr. Jyoti Verma, Dr. Tabish Abbasi, "A study for early risk assessment of Lipid Abnormalities in diabetic and non-diabetic patients in a Tertiary care centre in North India- A Cross sectional study", IJMSIR- January - 2024, Vol – 9, Issue - 1, P. No. 14 – 21.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Lipid abnormalities is becoming more common in general population which has major bad effect on health status. Various studies have been done on diabetes patients to know the dyslipidemia factor but there are limited studies being done to identify lipid abnormalities in general population. This study was done to assess the lipid abnormalities randomly in common population who have or not have any previous co-morbidities. The growing number of individuals with abnormal lipid levels is a major health concern. Early screening of lipid abnormalities in populations with and without hyperglycemic status can be an effective health management strategy. This can be achieved through timely identification of lipid variations and effective execution of lifestyle modifications.

This study included 200 patients and various demographic data along with Fasting lipid profile, Fasting and Random blood sugar were collected.

The aim of this study was to identify and assess lipid abnormalities and evaluate risk predictors for developing dyslipidemia in populations. The results showed that 63% of the population had some form of lipid abnormality, which can help establish future screening programs to identify lipid abnormalities in the general population. The population was divided in two groups diabetes with dyslipidemia and diabetes without dyslipidemia. Those in diabetes group revealed comparatively high levels of LDL, TG and TC and low levels of HDL.

Result: 63% of the local subjects had shown lipid derangements.

Among the varying lipid parameters, low HDL-C, high TC-c and TG-c was observed to be frequent.

Keywords: Diabetes, Dyslipidemia, LDL, TG and TC

Introduction

There are different types of lipids such as total cholesterol (TC), high density lipoprotein cholesterol (HDL-C),low density lipoprotein cholesterol (LDL-C), and Triglycerides (TG). Cardiovascular diseases are caused by certain risk factors where dyslipidemia is one of the main metabolic factors. The prevalence of

metabolic factors is uncreasing at an alarming rate all over the world. Lipid abnormalities are varying among countries. These prevalence patterns have been reported in many studies. [1-4]

There are several factors which are contributing to the lipid derangements like type 2 Diabetes Mellitus, hypertension, obesity [5] and Family history [6] . Uncontrolled hyperglycemia also promotes atherogenesis due to lipid abnormalities leading to cardiovascular risk.

Dyslipidemia can be caused by familial disorders. High levels of LDL-C are also caused by autosomal dominant mutations. Less common mutations in the cholesterol pathway have also been identified. [2,3].

Non-communicable diseases (NCDs) like cardiovascular diseases are very common and are known to be the leading cause of death in developing nations. [7,8]

Dyslipidemia is a modifiable risk factor for CAD. Its proper management would decrease morbidity and mortality rates [8,9]. Global mortality rates associated with NCDs are 71%, which are spreading at a faster rate.

Abnormal lipid profiles are strongly associated with cardiac diseases which increases the risk of myocardial infarction. [9,10]

There was earlier a belief that dyslipidemia is a late complication of diabetes, but studies revealed that this can be an early feature in diabetes. Diabetes and dyslipidemia are directly related to the dietery patterns and sedentary lifestyle.

Obesity [11] and diabetes are well known risk factors for dyslipidemia, as they can alter the composition of lipoproteins [12].

The increasing prevalence of people with abnormal lipid levels is a serious health concern. Early screening of lipid abnormalities in both hyperglycemic and non-hyperglycemic populations can be effective strategy for managing health. This can be achieved by identifying any lipid variations in a timely manner and implementing effective lifestyle modifications.

AIMs and Objectives

To identify and assess the lipid abnormalities and evaluate risk predictors for developing dyslipidemia in the general population and in diabetic patients.

Methods

1. Study Design and Setting
2. This cross-sectional study was carried out at the Department of Medicine in Dr. RMLIMS, Lucknow.

Subjects and Data Retrieval

A study was conducted to evaluate the fasting lipid profiles in general population. The participants were selected through non-probability convenience sampling, and those with comorbidities were also studied. The study included 200 participants, with special concentration on dyslipidemia in diabetics and non-diabetics.

To determine diabetes status blood sugar level Fasting > 125 and/or PP >200 were included . The study included 200 participants, who were divided into two groups based on their lipid profile: group I (diabetics with dyslipidemia) and group II (non-diabetics with dyslipidemia).

Dyslipidemia was identified if one of the following lipid parameters exceeded their cut-off values: This is characterised by high levels of total cholesterol(TC), LDL cholesterol(LDL-C), triglycerides(TG) , or low levels of HDL cholesterol (HDL-C).

To measure lipids, blood was withdrawn after a 12 hour fast and defined dyslipidemia as any of the following: TC > 200 mg/dl, LDL-C>100 mg/dl, TG>150 mg/dl, HDL-C< 40 mg/dl for men , HDL-C <50 mg/dl for women, non-HDL-C >130 mg/dl or taking lipid lowering drugs.

The participants' demographic data were recorded on a designed proforma after obtaining their informed written

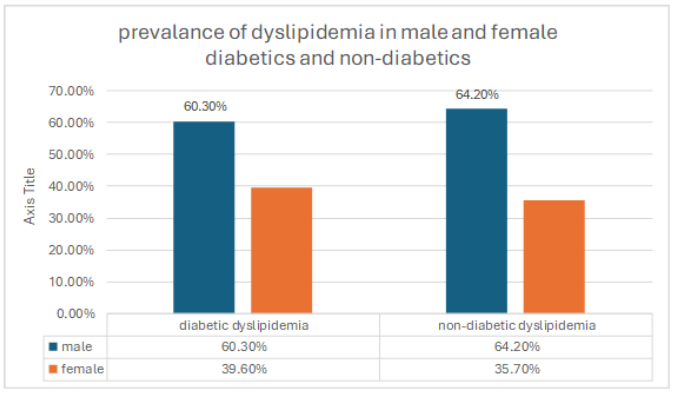
consent. The participants' data were kept confidential. Their clinical parameters record was obtained from the pathology laboratory of the hospital. The collected data included socioeconomic status, body weight, height , family history of dyslipidemia , lipid profile, and blood sugar level in fasting.

Statistical Analyses

The data were analyzed using the IBM SPSS software version 22.0. Percentages and means ± SD were used to present the data. Qualitative variables were reported as frequency and percentages. Logistic regression analysis was also performed to determine the association between variables. A p-value of < 0.05 was considered statistically aignificant. To compare the mean difference of variables between groups, an independent sample t-test was used.

Results

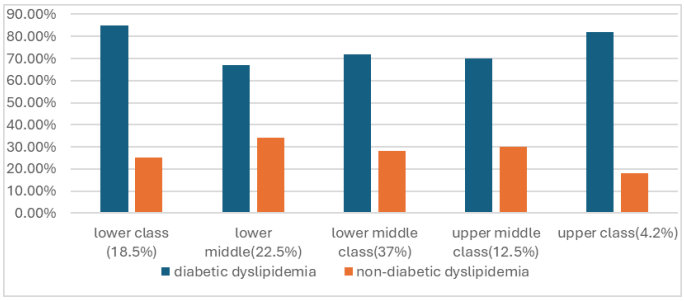
Sex distribution among diabetics and non-diabetics dyslipidemia



200 total patients

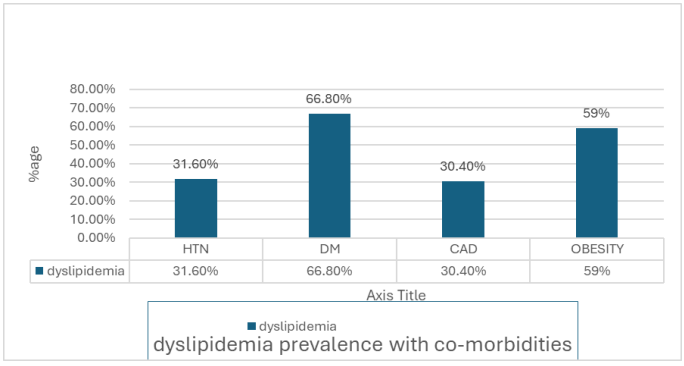
The mean age for the female study participants was (46.95 ± 12.25 years), and male study participants had a mean age of (51.89 ± 11.21 years). Within the groups, 116 (58%) participants were with diabetic dyslipidemia, and 84 (42%) were dyslipidemic stratified into males and females within the groups 122(61%) male, 78(39%) female 116(58%) diabetic dyslipidemia, 84(42%) in non diabetics dyslipidemia

Distribution of dyslipidemia in diabetics and non-diabetics among socioeconomic status.



The study classified the socioeconomic status of 200 subjects based on their social status and occupation, and divided them into five categories: low, lower middle, middle, upper middle, and upper classes. Out of the total subjects, 37 (18.5%) belonged to the lower class, 43 (22.5%) were from the lower middle class, 98 (49%) upper middle class ,13(6.8%) upper class 8(4.2%) .

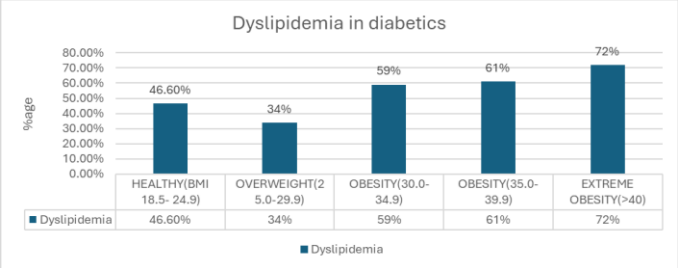
Prevalence of dyslipidemia in patients with co-morbidities



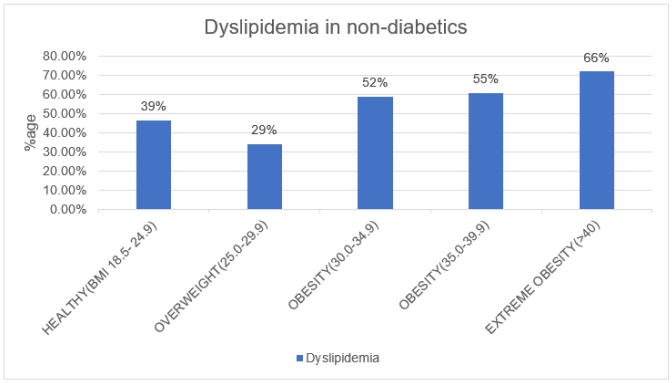
In the general population , prevalence of dyslipidemia was found variable as 31.60% among Hypertensive patient, 66.80% among diabetic patients, 30.40% among coronary heart disease and 59% in obesity patient.

Poor glycemic control was observed in diabetics of more long duration i.e., in >10 years. Of these dyslipidemic patients 53% were on hypolipidemic drugs. On comparison of study variables with dyslipidemia versus normal lipid levels , the lipid profile HDLc, LDLc, TC and TG ,revealed a highly significant difference. HbA1c, Fasting blood sugar and RBS were significantly higher in dyslipidemic patients.

Prevalence of dyslipidemia according to BMI



Physical activity were determined by the time duration questionnaire which included the time spent on sports, exercise and household activities. The participants activity were divided into active, moderate and inactive. The physical activity were divided as- 87 (43.5%) moderate, 68 (34%) inactive and 45 (22.5%) active.



The Dyslipidemia in diabetics is more than in non-diabetics in relation to increasing BMI. Above graph is showing direct relationship of dyslipidemia with BMI although this was not significant.

Comparison of FBG and lipid profile among diabetics and non-diabetics

The mean value of FBG in the non-diabetic patients and diabetics patients were statistically significant. The same value difference was found to be statisticaly significant (<0.0001) in lipid profiles of Diabetics and non diabetics.Among diabetics, the mean and standard deviation of TC, TG, LDL, VLDL is more than non-diabetics. HDL-C was found to be statistically significant and low more in diabetics than in non-diabetes

Parameters (mg/dl)	Diabetes Patients (Mean ± SD)	Non-Diabetic Patients (Mean ± SD)	P-value
TC	180±35.80	152±31.20	<0.0001
TG	167±37.20	130±37.25	<0.0001
HDL-C	34±6.23	43±10.32	<0.0001
LDL-C	110±23.89	92±19.20	<0.0001
VLDL-C	32±10.3	39±9.8	<0.0001
FBS	213±56	88±15	<0.0001

Statistical Analysis

Independent samples t-test was used to calculate the mean difference of continuous variables between groups. Groups like age, FBG, TC,TG,HDL,LDL and VLDL had their mean difference significant (p-value< 0.05).(Table1)

Table 1

Variables	Dyslipidemia In Diabetics	Dyslipidemia InNon-Diabetics	P-Value
Age (Years)	56.13±10.34	46.82±10.92	0.002
Fbs (Mg/Dl)	209±83.6	97.8±8.5	0.32
Hdl-C	16.12±5.3	18.92±4.5	0.001
Ldl-C	50.1±16.5	56.8±13.82	0.021
Tc	88.91±25.6	82.56±20.8	0.001
Tg	58.5±32.5	40.7±25.6	0.001
Bmi (Kg/M2)	23.19±32	27.82±3.45	0.46

Table 2: Linear regression analysis (dyslipidemia and its predictors)

Parameter	R^2	Gender Male =0 Female=1	Age	Socioeconomic status	Family history	Physical activity	BMI
HDL	0.024	0.051 (-0.023,0.076)	-0.012 (-0.045,0.023)	0.054 (-0.034,0.235)	-0.002 (-0.021,0.045)	-0.065 (-0.93,-0.034)	0.001 (-0.034,0.023)
p-value		0.342	0.320	0.450	0.254	0.031	0.876
LDL	0.056	0.123 (-0.198,0.265)	-0.002 (-0.012,0.034)	-0.045 (0.213,0.076)	-0.034 (-0.054,0.054)	-0.065 (-0.231,0.123)	-0.051 (-0.034,0.021)
p-value		0.523	0.434	0.634	0.376	0.678	0.402
TGs	0.012	-0.644 (-1.143,0.154)	-0.003 (-0.041,0.10)	0.123 (-0.178,0.543)	-0.012 (-0.123,0.561)	0.176 (-0.123,0.187)	0.063 (-0.234,0.149)
p-value		0.017	0.838	0.345	0.870	0.210	0.612
TCs	0.034	0.003 (-0.054,0.567)	0.056 (0.021,0.721)	-0.054 (0.043,0.071)	-0.034 (0.012,0.045)	-0.041 (0.042,0.018)	-0.156 (0.063,0.012)
p-value		0.045	0.298	0.464	0.034	0.626	0.212

Linear regression analysis was done between the lipid and various demographis parameters to determine the risk predictor. In the study no direct association eas found between lipid parameters and independent variables.Among the predictors. Physical activity was significant for HDL(0.032, p-value- 0.05) , gender as a predictor for abnormal TGs(0.017, p-value<0.05) and TCs(0.045, p-value<0.05) ,family history for deranged TC (0.034, p-value<0.005) in the groups.

Parameters	Non- Diabetics (84)		Diabeteics (N= 116)
TC	Normal	89%	78%
	Borderline	11%	13%
	High	0%	9%
TG	Normal	69%	61%
	Borderline	26%	28%
	High	5%	11%
HDL-C	Normal	25%	49%
	Borderline	68%	51%
	Low	7%	10%
LDL-C	Normal	61%	61%
	Borderline	22%	32%
	High	17%	7%
VLDL-C	Normal	80%	59%
	Borderline	20%	41%
	High	0%	0%

There was a significant increase in Triglyceride and VLDL cholesterol level in Diabetics than in nondiabetics. Diabetics has a maximum increase in the activity of TC (16%) and TG (19%). There is decrease in HDL-C in diabetics (7.76%) more than in non-Diabetics.VLDL-C shows (8%) increase and LDL-C shows 12.48% increase in Diabetics. Therefore in decreasing order, dyslipidemia with respect to varients is TG>TC>LDL>VLDL>HDL.

Discussion

According to studies, high levels of triglycerides (TGs) and decreasing count of high-density lipoprotein cholesterol (HDL-C) may lead to coronary heart diseases.[13] Our study analyzed various lipid profiles in patients with and without hyperglycemia. In a Chinese population, 48.27% of individuals had dyslipidemia, [14] while our study found that 58% of dyslipidemic patients had diabetes and 42% did not. Interestingly our study found a slightly higher number of dyslipidemic patients in the diabetes group than in normoglycemic group, which aligns with findings from a study in China.[6]

The study found that there was a higher occurrence of dyslipidemia in males (61%) with hyperglycemia and normoglycemia as compared to females (39%). Similar findings were observed in other studies conducted worldwide, but with varying frequencies. For Example, a study in Turkey found that more females(80.4%) had lipid abnormalities compared to males (78.7%).[15] Also

, a South African based study noted a higher frequency of dyslipidemic females(75.79%) than males(24.2%).[16]

The present study shows that there is not a significant decrease in HDL-C , both in hyperglycemic and normoglycemic groups, but reveals higher levels of TGs and TCs[17].

Another study demonstrated high levels of TC (51.2%) as compared to HDL (28.2%) and TGs (27.6%) among the studies.[18]

Our studies indicates that those with a sedentary lifestyle have more dyslipidemia among female participants (42.67%) than male participants(27.82%). This is in contrast to a study that showed unhealthy eating habits and sedentary lifestyles more prevalent in males than in females, contributing to the risk of dyslipidemia and hypertension.[19]. Another study revealed that more females (26.67%) are inactive, as compared to males (21.30%), with varying lipid parameters.

Based on our observations , a local study has revealed that a common pattern of dyslipidemia includes isolated high levels of triglycerides (TG) and low levels of HDL-C.[20] Reduced HDL-C indicates a possible risk factor for the development of cardiovascular disease. The development of this disease can be influenced by various factors, ranging from environmental to genetic factors.[21]

According to reports by the World health organisation (WHO), this outcome can cause 2.6 million deaths globally each year. Therefore, the aforementioned study highlights TGs, TCs and HDL as common lipid abnormalities.[22] Deranged lipid profile is directly related to a sedentary lifestyle, inactivity and higher body mass index (BMI).

However, this study has certain limitations. Some parameters or predictors or parameters, such as dietery and genetic/familial factors, were not studied. The family history was verbally obtained and no investigations were performed to reveal evidence

Conclusion

The findings above are showing lipid profile alteration is an independent risk factors and is not related to diabetes atatus . This can be the early predictor in diabetes and may not be the complication in later stages. In this study TG-C and TC-C are the most prevalent in dyslipidemia patients. But more than one variants are also present but its variability needs further separate study only in dyslipidemic patients.

Therefore, in the general population dyslipidemia is developing as a separate problem which needs real time solution management strategies to control disease outcome and related complications.

Author contributions: Study Design , Data acquisition , interpretation, and conception : Dr Jyoti Verma . Data collection and consent – Dr. Tabish Abbasi.

References

1. Chori, B.; Danladi, B.; Nwakile, P.; Okoye, I.; Abdullahi, U.; Zawaya, K.; Essien, I.; Sada, K.; Nwegbu, M.; Ogedengbe, J.; et al. Prevalence, patterns and predictors of dyslipidaemia in Nigeria: A report from the REMAH study. Cardiovasc. J. Afr. 2022, 33, 52–59.
2. Soliman, H.; Ibrahim, A. Prevalence and pattern of dyslipidemia in an Egyptian children and adolescents with type1 diabetes. Egypt Pediatr. Assoc. Gaz. 2021, 69, 21
3. Mahmoud, I.; Sulaiman, N. Dyslipidaemia prevalence and associated risk factors in the United Arab Emirates: A population-based study. BMJ Open. 2019, 9, e031969.
4. Gao, H.; Wang, H.; Shan, G.; Liu, R.; Chen, H.; Sun, S.; Liu, Y. Prevalence of dyslipidemia and associated

risk factors among adult residents of Shenmu City, China. PLoS ONE 2021, 16, e0250573.

5. Mohamed-Yassin, M.S.; Baharudin, N.; Daher, A.M.; Abu Bakar, N.; Ramli, A.S.; Abdul-Razak, S.; Mohamed Noor Khan, N.A.; Mohamad, M.; Yusoff, K. High prevalence of dyslipidaemia subtypes and their associated personal and clinical attributes in Malaysian adults: The REDISCOVER study. BMC. Cardiovas. Dis. 2021, 21, 149.
6. Shahid, S.U.; Sarwar, S. The abnormal lipid profile in obesity and coronary heart disease (CHD) in Pakistan is ubjects. Lipids Health Dis. 2020, 19, 73.
7. Shahwan, M.J.; Jairoun, A.A.; Farajallah, A.; Shanabli, S. Prevalence of dyslipidemia and factors affecting lipid profile in patients with type 2 diabetes. Diabetes Metab Syndr. Clin Res. Rev. 2019, 13, 2387–2392.
8. Sarfraz, M.; Sajid, S.; Ashraf, M.A. Prevalence and pattern of dyslipidemia in hyperglycemic patients and its associated factors among Pakistani population. Saudi. J. Biol. Sci. 2016, 23, 761–766.
9. Nelson, R.H. Hyperlipidemia as a risk factor for cardiovascular disease. Prim Care. Clin. Office Prac. 2013, 40, 195–211. [CrossRef]
10. Park, J.B.; Kim, D.H.; Lee, H.; Hwang, I.C.; Yoon, Y.E.; Park, H.E.; Choi, S.Y.; Kim, Y.J.; Cho, G.Y.; Han, K.; et al. Mildly abnormal lipid levels, but not high lipid variability, are associated with increased risk of myocardial infarction and stroke in“statin-naive”young population a nationwide cohort study. Circ. Res. 2020, 126, 824–835.
11. Howard, B.V.; Ruotolo, G.; Robbins, D.C. Obesity and dyslipidemia. Endocrinol. Metab. Clin. 2003, 32, 855–867.
12. Kreisberg, R.A. Diabetic dyslipidemia. Am. J. Cardiol. 1998, 82, 67U–73U.
13. Caselli, C.; De Caterina, R.; Smit, J.M.; Campolo, J.; El Mahdiui, M.; Ragusa, R.; Clemente, A.; Sampietro, T.; Clerico, A.; Liga, R.; et al. Triglycerides and low HDL cholesterol predict coronary heart disease risk in patients with stable angina. Sci. Rep. 2021, 11, 20714.
14. Li, Y.; Zhao, L.; Yu, D.; Ding, G. The prevalence and risk factors of dyslipidemia in different diabetic progression stages among middle-aged and elderly populations in China. PLoS ONE 2018, 13, e0205709.
15. Bayram, F.; Kocer, D.; Gundogan, K.; Kaya, A.; Demir, O.; Coskun, R.; Sabuncu, T.; Karaman, A.; Cesur, M.; Rizzo, M.; et al. Prevalence of dyslipidemia and associated risk factors in Turkish adults. J. Clin. Lipidol. 2014, 8, 206–216.
16. Masilela, C.; Adeniyi, O.V.; Benjeddou, M. Prevalence, patterns and determinants of dyslipidaemia among South African adults with comorbidities. Sci. Rep. 2022, 12, 337.
17. Ahmad, B.; Aziz, K.; Hassan, N.U.; Kaiser, R.M.; Alvi, K.Y. Frequency of hypertriglyceridemia in newly diagnosed type 2 diabetics. Pak. Armed Forces J. 2016, 66, 88–91.
18. Achila, O.O.; Araya, M.; Berhe, A.B.; Haile, N.H.; Tsige, L.K.; Shifare, B.Y.; Bitew, T.A.; Berhe, I.E.; Mengistu, S.T.; Yohaness, E.G. Dyslipidemia and associated risk factors in the elderly population in Asmara, Eritrea: Results from a community-based crosssectional study. J. Lipids 2021, 2021, 6155304.
19. Qiu, L.; Wang, W.; Sa, R.; Liu, F. Prevalence and risk factors of hypertension, diabetes, and dyslipidemia among adults in Northwest China. Intl. J. Hypertens. 2021, 2021, 5528007.
20. Zaid, M.; Hasnain, S. Plasma lipid abnormalities in Pakistani population: Trends, associated factors, and

clinical implications. Braz. J. Med. Biol. Res. 2018, 51, e7239.

21. Raised Cholesterol-WHO Global Health Observatory (GHO) Data. Available online: https://ww.who.int/data/gho/indicatormetadata-registry/imr-details/3236 (accessed on 23 December 2021).
22. Noncommunicable Disease. Available online: https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases (accessed on 25 May 2021).