IOSR Journal of Nursing and Health Science (IOSR-JNHS)
e-ISSN: 2320–1959.p- ISSN: 2320–1940 Volume 9, Issue 3 Ser. VII (May - June 2020), PP 01-07
www.iosrjournals.org

Enteric Gastrointestinal Tract Opportunistic parasitic Infections of HIV/AIDS Patients in Limbe and its Environs South - West Region, Cameroon

Djam Chefor Alain[1], Marcelus U. Ajonina[2], Ngam Lois Nabuin[3]
[1]Department of Plant and Animal Sciences, Faculty of Science, University of Buea, Cameroon
[2]*Department of Health Services, Meridian Global University Buea, Cameroon*
[3]*Department of Health and Human Services, Saint Monica University Buea, Cameroon*

Abstract: *The present cross-sectional study aimed to determine the prevalence of gastrointestinal tract enteric opportunistic parasitic infections in human immunodeficiency virus and acquired immunodeficiency syndrome (HIV/AIDS) patients with or without diarrhoea in Limbe (Cameroon) and its environs. Parasitic infections of the intestinal tract are a major cause of disease in patients infected with the human immunodeficiency virus (HIV), particularly in the tropics. Diarrhoea is also a common complaint among patients in the tropics and specific pathogens are being identified in more than half of human immunodeficiency virus and acquired immunodeficiency syndrome (HIV/AIDS) patients. These among others include: Cryptosporidium parvum, Isospora belli, Microsporidium spp., Giardia lamblia, Trichomonas intestinalis, Entamoeba histolytica and Cyclospora cayetanensis. A total of 300 stool samples from 100 HIV-positive patients with treatment, 100 HIV-positive patients without treatment and 100 control samples from patients with or without diarrhoea were collected and examined for enteric parasites by microscopy using wet mount and acid staining techniques. Enteric parasites were detected in 53.7% of patients. Prevalence of 45.5% of Cyclospora cayetanensis and 46.8% of Cryptosporidium parvum were the least significant in patients with diarrhoea, while those without diarrhoea had prevalence of 54.5% and 53.2%, respectively ($p<0.05$). A total of 56.6% severely immunosuppressed patients with $CD4^+$ T-cell counts less than 200 cells/µl were infected with Cryptosporidium parvum ($p<0.05$). Up to 80% patients not on anti-retroviral (ARV) therapy were infected with Strongyloides stercoralis, whilst 17.4% patients subjected to ARV therapy were infected with Microsporidium spp. It was concluded that enteric parasitic infections are common in HIV/AIDS patients with or without diarrhoea.*

Key words*: Gastrointestinal tract, Opportunistic, Enteric parasites, HIV/AIDS, Limbe-Cameroon.*

Date of Submission: 26-05-2020 Date of Acceptance: 13-06-2020

I. Introduction

Parasitic infections of the intestinal tract are a major cause of disease in patients infected with the human immunodeficiency virus (HIV), particularly in the tropics. Diarrhoea is a common complaint among patients in the tropics and specific pathogens are being identified in more than half of human immunodeficiency virus and acquired immunodeficiency syndrome (HIV/AIDS) patients [1]. Gastrointestinal involvement in HIV/AIDS is almost universal, and significant disease occurs in 50–96% of patients [1]. Diarrhoea can be a presenting manifestation or a life-threatening complication of infection with HIV sometimes during the course of the disease. Infectious causes of diarrhoea have been found in 30–80% of patients depending on the extent of the study and patient characteristics [1]. Such pathogens include opportunistic agents that consistently cause severe, chronic or frequent gastrointestinal disease and non-opportunistic agents that usually cause acute, treatable diarrhoea. These among others include: *Cryptosporidium parvum*, *Isospora belli*, *Microsporidium* spp., *Giardia lamblia*, *Trichomonas intestinalis*, *Entamoeba histolytica* and *Cyclospora cayetanensis*. As well as these, the nematode *Strongyloides stercoralis*, a ubiquitous parasite in tropical and subtropical areas, can cause diarrhoea and overwhelming infestation (hyper-infection syndrome) in patients with a variety of immunosuppressive disorders including HIV/AIDS. Cryptosporidiosis and microsporidiosis are two enteric microorganisms most commonly associated with persistent diarrhoea and wasting in immunologically compromised individuals, involving mostly people with HIV/AIDS [3][6][9]. Whereas cryptosporidiosis is known to also be a common cause of acute diarrhoea in all ages of immunologically healthy people [4][5], microsporidiosis does not appear to be associated with neither acute illness, nor, it seems in general, with immunologically healthy people. Studies on HIV-infected patients show that no aetiological agent is found in 15–50% of patients with chronic diarrhoea [2].

Infection with HIV provokes an immune response in the host but which is not enough to eliminate the virus due to its genetic diversity and its capacity for mutation. This leads to mutated species with varied epitopes, which cannot be recognized by the paratopes of the antibodies produced during seroconversion [13] . HIV infections result in severe destruction of $CD4^+$ T-cells as the virus undertakes lytic replication cycles in the infected $CD4^+$ T-cells. The cellular arm of the immune system thus becomes weakened. It is therefore thought that in advanced states of HIV infection (AIDS), the $CD4^+$ T-cells are drastically diminished and, as such, parasites which produce self-limiting diseases in immunocompetent hosts tend to result in severe outcomes in immunocompromised subjects [11][5]. The prevalence of intestinal pathogens among HIV-infected individuals has dramatically decreased in countries where anti-retroviral (ARV) agents are widely available [8]. However, in most African countries, few patients have access to ARV therapy. The aim of this study therefore was to determine specific gastrointestinal tract enteric opportunistic parasites and their association with HIV/AIDS as well as establishing possible a relationship between the parasites present and the $CD4^+$ value in HIV patients.

II. Materials and methods

2.1 Study area

This study was carried out at the voluntary counselling, testing and treatment centre of the Limbe Regional Hospital and Life Science Laboratory of the University of Buea in the South West Region of Cameroon. Limbe is a lowland zone situated in Fako Division in the South West region. Fako Division has a population of about 80,700 people and is located between latitude 4°00′ and 6°50′ north of the Equator and between longitude 8°50′ and 10°00′ east of the meridian. It has a mean annual temperature of 26°C and altitude between 0 and 50 m above sea level.

2.2 Collection and analysis of stool samples

Each subject was given a screw-capped plastic bottle for the collection of faecal sample. Plastic bottles were clean, dry, leak-proof, transparent and free from all traces of antiseptics. Bottles were labelled with a number for each patient. The age (children, 1–10 years; adolescents, 11–17 years; adults, 18–60 years; and elderly, > 61 years), sex, locality, presence or absence of diarrhoea and $CD4^+$ count (HIV-positive patients) of each patient was recorded. The site of collection was the laboratory of the hospital. Patients were properly instructed on how to collect samples, as any sample containing water or urine would cause eggs to hatch into larval forms as such, any samples with liquid was discarded. The quantity of stool collected was about 1g and each sample was placed in a box filled with ice and transported to the laboratory for diagnosis.

2.3 Collection and examination of stool samples

Fresh stools were immediately prepared and examined by direct smear method to view motile protozoans while samples which could not be observed on the same day were treated with 10% formol–saline solution and stored in a refrigerator for subsequent observation. Diarrhoea was defined as passing of watery stools continuously for about 2 weeks.

A total of 300 patients were recruited for this study and clinical data collected using questionnaires. HIV-positive patients with treatment (n = 100), HIV-positive patients not with treatment (n = 100) and control samples (n = 100) were classified as follows: children, adolescents, adults and elderly with or without diarrhoea. Faecal specimens were collected from each patient and transported to the laboratory within 1h for parasitological study. Stool samples were examined for enteric protozoans and the nematode *S. stercoralis* using the direct wet mount and concentration technique by the formol–ether sedimentation method. Each stool specimen was stained using the modified kinyoun acid–fast staining technique to detect coccidian parasites.

2.4 Data analysis

Data were entered using Microsoft Excel and analysed using Statistical Package for the Social Sciences ($SPSS^{TM}$) version 17. Statistical analysis was done using χ^2 to evaluate any association between HIV, diarrhoea, parasite/load and $CD4^+$ cell count. Observed differences in data were considered significant and noted at a probability level of 95% (p=0.05).

2.5 Ethical Clearance

The study was approved by the institutional review board of the faculty of sciences of the University of Buea. Administrative clearance and authorization was obtained from the Delegation of Public Health South West Region Buea as well as the Buea District Health Services respectively, permitting us to carry out research at the Limbe central hospital mile one. At an individual level, verbal consent and or a filled informed consent was received from each participant before data collection. The principles of privacy and confidentiality were upheld.

III. Results

3.1 Demographics and prevalence (%) of enteric infection in HIV negative and positive patients, relative to age and sex

There was an overall prevalence of 37.1% males with enteric parasitic infections in the control group, which was higher than the prevalence of 31.3% infected control females. In HIV-positive patients without treatment, 41.0% male patients were infected, higher than the 29.2% infected female patients. There was a rather higher prevalence of 39.5% in HIV-positive female patients with treatment compared with 21.9% in males (table 1). Patients were grouped as follows: children (1–10 years), adolescents (11–17 years), adults (18–60 years), and elderly (> 61 years). Children had the least prevalence of infection among the different groups with a prevalence of 6.2% in HIV-positive patients with treatment, 0.0% in HIV-positive patients without treatment and the highest prevalence of 93.8% among HIV-negative patients. Among HIV-positive patients with treatment, adolescents had the highest prevalence of 38.5% followed by adults with 34.3% and the elderly with 10.0%, while in HIV-positive patients without treatment, adults had the highest prevalence of 37.6% followed by adolescents with 33.3% and the elderly with 10.0%, respectively. Among HIV-negative patients, the elderly had the highest prevalence of 80.0%, followed by adolescents with 28.1% and adults with 28.1%.

Table 1: Demographics and prevalence (%) of enteric infection in HIV negative and positive patients, relative to age and sex

Age group in years	HIV negative patients	HIV positive patients without treatment	HIV positive patients with treatment
Children (0-10)	15 (93.8)	0 (0)	1 (6.2)
Adolescent (11-17)	27 (28.1)	32 (33.3)	37 (38.5)
Adult (18-59)	50 (28.1)	67 (37.6)	61 (34.3)
Old (≥60)	8 (80.0)	1 (10.0)	1 (10.0)
Sex			
Female	61 (31.3)	57 (29.2)	77 (39.5)
Male	39 (37.1)	43 (41.0)	23 (21.9)

Level of significance P=40.243, χ^2 =0.000, P=9.846, χ^2 =0.007

3.2 Occurrence of single and mixed enteric infections in HIV negative and positive patients.

Five species of parasites were identified in 162 patients, with *Cryptosporidium parvum* showing the highest prevalence of 23.3% in the three categories. This was followed by *I. belli* with 8.7%, *C. cayetenensis* with 8.3%, *Microsporidium* spp. with 7.0% and *S. stercoralis* with 1.7%. Only one case of triple infection was present among the HIV-positive patients without treatment and 14 cases of double infections among those with different HIV status. The difference in the prevalence of single and mixed infections was significant.

Table 2: The occurrence of single and mixed enteric infections in HIV negative and positive patients.

Parasite species	HIV negative patients	HIV positive patients without treatment	HIV positive patients with treatment	Total
Cyclospora cayetanensis	11 8	6 25		
Cyclospora cayetanensis + *Cryptosporidium parvum*	4	0	1	5
Cyclospora cayetanensis + *Strongyloides stercoralis* + *Microsporidium spp*	0 1	0	1	
Cyclospora cayetanensis + *Strongyloides stercoralis*	0	1	0	1
	21	30	19	70
Crptosporidium	1	3	1	5

parvum				
Crptosporidium parvum + Isospora belli	0	1	0	1
Cryptosporidium parvum + Strongyloides stercoralis	8	10	8	26
Isospora belli	0	1	0	1
Isospora belli+ Microsporidium spp	1	17	3	21
Microsporidium spp	0	0	1	1
Microsporidium spp+ Strongyloides stercoralis	4	1	0	5
Strongyloides stercoralis				
Total	50	73	39	162

3.3 Prevalence (%) of diarrhoea in HIV negative and positive patients.

An overall prevalence of 34.6% of diarrhoea among HIV-negative patients was higher than a 30.2% of those without diarrhoea. HIV-positive patients with diarrhoea had a higher prevalence of 39.5% than a 30.8% of those without diarrhoea whilst HIV-positive patients with treatment had a higher prevalence of 34.6% in patients without diarrhoea than a 30.2% of those with diarrhoea. The overall prevalence of HIV and diarrhoea was not significant.

Table 3 : The Prevalence (%) of diarrhoea in HIV negative and positive patients.

Diarrhoea	HIV negative patients	HIV positive patients without treatment	HIV positive patients with treatment	Total Prevalence of Diarrhoea
Present	26 (30.2) 34 (39.5)	26 (30.2) 86 (28.7)		
Absent	74 (34.6) 66 (30.8)	74 (34.6)	214 (71.3)	
Total	100(64.8)	100(70.3)	100(64.8)	300(100)

Level of significance P=2.087, χ^{2} =0.352

3.4 Relationship between parasite prevalence (%), HIV status and rural and urban dwellings of patients

Prevalence rates of parasitic infection among those living in rural and urban communities was 25.0% and 51.0%, respectively, for HIV-negative patients, 50.0% and 74.4% for HIV-positive patients not with treatment and 50.0% and 37.5% for HIV-positive patients with treatment (table 4). This association was, however, not significant (p>0.005). Patients with $CD4^{+}$ T-cell counts less than 200 cells/µl had a prevalence of 51.5% compared with 66.1% and 0.0% for patients with $CD4^{+}$ T-cell counts between 200 and 499 cells/µl and greater than or equal to 500 cells/µl, respectively.

Table 4: The relationship between parasite prevalence (%), HIV status and rural and urban dwellings of patients

Parasites species	Severely suppressed (<200 cell/µl)	Mildly suppressed (200-499 cell/µl)
Cyclospora cayetanensis	14 (77.8)	2 (22.2)
Cryptosporidium parvum	30 (56.6)	23 (43.4)
Isospora belli	13 (59.1)	9 (40.9)
	16 (69.6)	7 (30.4)

Microsporidium spp	3 (60.0)	2 (40.0)		
Strongyloides stercoralis	70 (51.5)	41 (66.1)		
Total				
P = 0.072				
HIV status	Residence	Number of patients with parasites	χ^2	P-value
HIV negative patients	rural urban	1/4 (25.0) 49/96 (51.0)	χ^2 =1.042,	P = 0.307
HIV positive patients not with treatment	rural urban	5/10 (50.0) 67/90 (74.4)	χ^2 = 2.668	P = 0.102
HIV positive patients with treatment	rural urban	6/12 (50.0) 33/88 (37.5)	χ^2 = 0.694	P = 0.405

3.5 Relationship between parasite prevalence (%), diarrhoea and anti-retroviral therapy (ARV) in all patients under study

Overall prevalences of 45.5% *Cyclospora cayetanensis* and 46.8 % *Cryptosporidium parvum* were significantly less in patients with diarrhoea than prevalences of 54.5% and 53.2% in patients without diarrhoea, respectively (p<0.05). *I. belli*, *Microsporidium* spp. and *S. stercoralis* had prevalences of 71.0%, 66.7% and 77.8%, respectively, which were higher in patients without diarrhoea than prevalences of 29.0%, 33.3% and 22.2% in patients with diarrhoea, respectively (table 5). *S. stercoralis* had a higher prevalence 80.0% in patients not yet on ARV therapy. *Microsporidium* spp. had a prevalence of 17.4%, which was significantly associated with patients on ARV therapy (p<0.05), while the association between *Cyclospora cayetanensis*, *I. belli*, *Cryptosporidium parvum*, being 38.9%, 40.9% and 39.6%, respectively, and ARVs was not statistically significant (p>0.05)

Table 5: The relationship between parasite prevalence (%), diarrhoea and anti-retroviral therapy (ARV) in all patients under study

parasites	Number of patients					
	with diarrhoea	without diarrhoea	with anti-viral therapy	Without anti-viral therapy	χ^2	P value
Cyclospora. Cayetanensis	15 (45.5)	18 (54.5)	7 (38.9)	11(61.1)	5.110	0.024
Cryptosporidium. parvum	37 (46.8)	42 (53.2)	21 (39.6)	32 (60.4)	17.312	< 0.01
Isospora belli	9 (29.0)	2 (71.0)	9 (40.9)	13 (59.1)	0.002	0.962
Microsporidium spp	8 (33.3)	16 (66.7)	4 (17.4)	19 (82.6)	0.278	0.59
Strongyloides stercoralis	2 (22.2)	7 (77.8)	1 (20.6)	4 (80.0)	0.188	0.664
Total	64 (74.4)	97 (45.3)	39 (39.0)	72 (72.0)	20.880	0.000

IV. Discussion and Conclusion

Enteric opportunistic parasitic infections continue to be a ubiquitous complication of advanced HIV infections and are the most important causes of morbidity and mortality [17]. The overall prevalence of intestinal parasites in stool samples was 57.7% compared with 55% obtained in a similar study in Ethiopia [15]. It has been reported that diarrhoea is an important clinical problem among HIV-infected patients and is associated with significant impairments in health-related quality of life [16]. A higher prevalence of infections in cases without diarrhoea is because there are other aetiologies to diarrhoea, such as fungi and bacteria, and not necessarily parasites. This study showed that diarrhoea is a concern among patients regardless of their HIV status. The role of either HIV or parasitic infection independently or as a co-infection to cause any type of diarrhoea or chronic diarrhoea was significant particularly among patients with $CD4^+$ T-cell counts less than 200 cells/µl. This corroborates with a study carried out which reaffirms the view that diarrhoea is an AIDS-defining condition [12].

Prevalence of diarrhoea in the study population was 28.7%, similar to the 29% prevalence obtained in a similar study conducted in Yaounde, Cameroon [14]. This could be because both towns (Limbe and Yaounde) are urban settings and it is generally true that with urbanization, there is increase in hygienic conditions which decreases pathogen profiles and diarrhoea. Among HIV-positive patients with treatment, ARVs help to build up the immune system to fight against antigens which can cause diarrhoea infection.

Parasites most associated with diarrhoea in this group of patients were *Cryptosporidium parvum* (46.8%), *Cyclospora cayetanensis* (45.5%), *I. belli* (29.0%) and *Microsporidium* spp. (33.2%). This trend was similar to *Cryptosporidium parvum* (40%), *Cyclospora cayetanensis* (47%), *I. belli* (31%) and *Microsporidium* spp. (35.6%) found in other studies [10][1].

Enteric parasites were more prevalent in patients with $CD4^+$ T-cell counts less than 200 cells/µl (51.5%) compared with 66.1% for patients with $CD4^+$ T-cell counts between 200 and 499 cells/µl, respectively. This trend was similar to the 38.6% and 30.2% prevalence in patients with $CD4^+$ T-cell counts less than 200 and between 200 and 499 cells/µl, respectively, in a study carried out by [7].

Enteric parasites were significantly more prevalent in patients who were not on ARVs (72.0%), compared with those on ARVs (39.0%). This trend was similar to that reported in Ethiopia, with a prevalence of 48% for patients on ARVs and 52.0% for patients not on ARVs [7]. A lower prevalence of enteric parasitic infections in patients on ARV therapy could be because ARVs improve $CD4^+$ T-cell counts, thus decreasing enteric parasites. Enteric parasitic infections are prevalent among HIV/AIDS patients presenting with diarrhoea which is an important source of clinical complications in patients, though not all diarrhoea is due to parasitic infections.

Enteric parasitic infections are common in patients with HIV/AIDS. In this study, it is worth noting that the prevalence of enteric parasites (53.7%) cannot be negligible. The high prevalence of intestinal parasitic infections in the study population warrants an urgent need of intervention and awareness so as to avoid more infections which can be fatal.

Acknowledgements

Our heartfelt gratitude goes to the laboratory assistance of the Department of Plant and Animal Sciences, University of Buea for assisting us with various diagnostic techniques. Our appreciation also goes to the administration and staff of Limbe regional hospital where we collected samples, especially to the laboratory technicians for their assistance and placement of equipment at our disposal. We also appreciate Mr Ekombe Franklin for his assistance with data analysis.

References

[1]. Algabert, T. & Tarimo, D.S. Prevalence of intestinal parasites in adult patients with enteropathic AIDS in North-Eastern Tanzania. *East African Medical Journal* 2009 ;73, 397–399.
[2]. Arenas, P.A., Certad, G. & Ferrara, G. Association between parasitic intestinal infections and acute or chronic diarrhoea in HIV-infected patients. *International Journal of Sexually Transmissible Diseases and AIDS* 2003); 14, 487–492.
[3]. Cegielski, J.P., Ortega, Y.R., McKee, S., Madden, J.F., Gaido, L., Schwartz, D.A., Manji, K., Jorgensen, A.F., Miller, S.E., Pulipaka, U.P., Msengi, A.E., Mwakyusa, D.H., Sterling, C.R. & Reller, L.B. *Cryptosporidium*, *Enterocytozoon*, and Cyclospora infections in pediatric and adult patients with diarrhea in Tanzania. *Clinical Infectious Diseases* 1999; 28, 314–321.
[4]. Griffiths, J.K. Human-cryptosporidiosis: epidemiology, transmission, clinical disease, treatment and diagnosis. In *Advances in parasitology*. London: Academic Press, pp.1988; 38–85.
[5]. Guerrant, R. Cryptosporidiosis: an emerging, highly infectious threat. *Emerging Infectious Diseases* 1997; 3, 551–557.
[6]. Gumbo, T.S.S., Gangaidzo, I.T., Ortega, Y., Sterling, C.R., Carville, A., Tzipori, S. & Wiest, P.M. Intestinal parasites in patients with diarrhea and human immunodeficiency virus infection in Zimbabwe. *AIDS* 1999; 13, 819–821.
[7]. Haileeyesus, A. & Beyene, P. Intestinal protozoans infections among HIV positive persons with and without antiretroviral treatment (ART) in selected ART centers in Adama, Afar and Dire-Dawa, Ethiopia. *Ethiopian Journal of Health Development* 2009; 23, 133–140.
[8]. Le Moing, V., Bissuel, F., Costagliola, D., Eid, Z., Chapuis, F., Molina, J.M., Salmon-Ceron, D., Brasseur, P. & Leport, C. Decreased prevalence of intestinal cryptosporidiosis in HIV-infected patients' concomitant to the widespread use of protease inhibitors. *AIDS* 1998; 12, 1395–1397.
[9]. Maggi, P., Larocca, A., Quarto, M., Serio, G., Brandonisio, O. & Angarano, G. Effect of antiretroviral therapy on cryptosporidiosis and microsporidiosis in patients infected with human immunodeficiency virus type 1. *European Journal of Clinical Microbiology and Infectious Disease* 2000; 19, 213–217.
[10]. Martin, P. & Punpoowong, B. Opportunistic protozoa in stool samples from HIV-infected patients. *Southeast Asian Journal of Tropical Medicine and Public Health* 1998; 29, 31–34.
[11]. Miao, Y.M. & Gazzard, B.G. Management of protozoal diarrhoea in HIV disease. *HIV Medicine* 2000; 1, 194–199.
[12]. Mith, P.D. & Jana, E.N. Infectious diarrhoea in human immunodeficiency virus infection. *Gastroenterology Clinics of North America* 1988; 17, 587–598.
[13]. Parham, P. Acquired immune deficiency syndrome in the immune system published. *East African Journal of Public Health* 2000; 22, 259–290.
[14]. Sarfeti, C., Anke, B., Jean, M., Florian, L., Moyou-Somo, R., Delaporte, E., Derouin, F., Eitel, M., Ngole, N. & Molina, J. Prevalence of intestinal parasites including microsporidia in human immunodeficiency virus-infected adults in Cameroon. *American Journal of Tropical Medicine and Hygiene* 2005; 68, 710–715.
[15]. Shimelis, A., Berhanu, E., Girmay, M., Zelalem, A. & Tachalew, S. Intestinal parasitic infection in relation to HIV/AIDS status diarrhoea and $CD4^+$ T-cell count. *BioMed Central Infectious Diseases* 2009; 9, 155.

[16]. Siddiqui, U., Bini, EJ., Chandarana, K., Leong, J., Ramsetty, S., Schiliro, D. & Poles, M. Prevalence and impact of diarrhoea on health-related quality of life in HIV-infected patients in the era of highly active antiretroviral therapy. *Journal of Clinical Gastroenterology* 2007; 41, 484–490.
[17]. Vajpayee, N., Kanswal, S., Seth. P. & Wig, N. Spectrum of opportunistic infections and profile of $CD4^+$ counts among AIDS patients in North India. *Infection* 2003; 31, 336–340.

Djam Chefor Alain, et. al. "Enteric Gastrointestinal Tract Opportunistic parasitic Infections of HIV/AIDS Patients in Limbe and its Environs South - West Region, Cameroon." *IOSR Journal of Nursing and Health Science (IOSR-JNHS)*, 9(3), 2020, pp. 01-07.