Physical Inactivity as a Factor Affecting Quality of Life in People with Non-Communicable Diseases – A Descriptive Cross - sectional Assessment

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Abstract:

   Background: *Physical inactivity acts as a threat to human life, which has increased the burden of diseases, due to demographic transition, change in life style, and change in various aspects of personal and social life [3]. Developed countries are equipped for the promotion of physical activity whereas developing countries are struggling to stabilize their basic public health parameters. As a result of lack of concern from the governments they face huge risk of Non Communicable Diseases [NCD]. The study proposed the vigor of this risk in the "coal capital" Dhanbad district, situated in Jharkhand, India.*

   Objectives: *The study intends to find the prevalance of physical inactivity in people with NCDs and its impact on their quality of life [QOL].*

   Material and Methods: *World Health Organization Quality Of Life (WHOQOL) –BREF questionnaire and Global Physical Activity Questionnaire (GPAQ) with validated survey tools were complied together to gather information from 192 (52.6%) household based and 173 (47.4%) hospital based individuals through the Multistage random sampling procedure at Dhanbad district with a population of 26, 82,662 (2011 census). [22] SPSS (Version 17) was used for data entry and statistical analysis. Statisical analysis involved descriptive*

statistics and mediation analysis. Statistical significance was determined at 10%.

Results: The study shows that 72% of the people with NCD remain physically inactive. The Physical activity acts as a mediator for QOL among those with Non Communicable Diseases (P<0.01).

Conclusions: Promotion of physical activity would be a significant step towards the promotion of better Quality of Life for people with NCDs.

Key words: Non Communicable Diseases, Physical inactivity, Quality of Life, NPCDS National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke.

Introduction:

NCDs are defined as diseases or conditions that occur in, or are known to affect, individuals over an extensive period of time and for which there are no known causative agents that are transmitted from one affected individual to another. [1] For the purpose of this study we have considered NCD's like - cardiovascular diseases, diabetes, hypertension, stroke and osteo-arthritis, while commonly known risk factors for these include lack of exercise, improper diet and smoking.[2] Physical inactivity is one of the biggest threats to the middle and high income countries, which have increased their burden of diseases.[3] The alarming high rise of physical inactivity has not only brought together the countries to come up for an effective solution to address this issue at the UN high level meeting in 2011, but has also made countries to frame suitable policies and to act on them.[4] In spite of the global alarm on the issue, the government of India has just a few programs to address the issue of decreasing physical inactivity which makes it a severe threat to the community.[5,6] India has a lot of inequities and a very small portion of the GDP is spent on health.[7,8] The cost implications of NCDs to society are enormous and run into

thousands of crore in rupees that include direct costs to people with illness, their families and indirect costs to society, due to reduced productivity. [9]

Policies are driven by suitable evidence, and in spite of global evidence that an investment in addressing the modifiable determinant (raised blood pressure, cholesterol, tobacco use, unhealthy diet, physical inactivity, alcohol consumption, and obesity) would be one of the most cost effective ways to address the menace due to NCDs, sufficient emphasis is not placed on them.[10] Still, for the majority of the states, achieving their targets of improving the basic health indicators (IMR, MMR, Immunization, family planning, water and sanitation) remains a big issue to be addressed.[11,12] Physical inactivity is still not assessed in the National Health Surveys. [13, 14, 15]

Cardiovascular disease, cancer, chronic lung diseases and diabetes are the four major NCDs that kill three in five people worldwide, and cause great socioeconomic harm within all countries, particularly in developing nations. [16] India has an over 1.2 billion population and there is high prevalence of risk factors for NCDs.[17] Physical activity is considered as an important behavior that helps to prevent millions of premature deaths and unwanted burden on the country and the family. The country is experiencing a rapid health transition with a rising burden of NCDs which are emerging as the leading cause of death in India accounting for over 42% of all deaths with considerable loss in potentially productive years (aged 35-64 years) of life.[18] According to a WHO report (2002), cardiovascular diseases (CVDs) will be the largest cause of death and disability in India by 2020. [19]

As government is least concerned about the issue of the decreasing physical inactivity and there is no information on physical inactivity, this study conducted in Dhanbad focuses to find the level of physical inactivity and to develop some recommendations for promoting physical activity.[20] This study has two objectives, first to assess the level of Physical inactivity

in people with NCDs and second - to find out how it affects their QOL.

Materials and Methods:

The study was based on descriptive cross - sectional assessment and involves 192 (52.6%) household based individuals and 173 (47.4%) individuals visiting hospitals OPD with NCDs who were selected thourgh the multistage random sampling procedure. The sample size was determined at 90% confidence level, considering the prevalence of physical activity to be at 54% in India based on the INDEPTH Study in five Asian countries. [21] The required minimum sample size is 365.

The study was done among 365 individuals in Dhanbad district of Jharkhand with a population of 26, 82,662 (2011 census) with a literacy rate of 74.94% and having average household size of 5.57. [22] The city is known for being the coal city of India. The major economy to the city comes from Bharat coaking coal limited (BCCL) and a majority of the people in the city are employees of BCCL. [23] Health care facilities are availed by both private and government sector, and a major contributor is BCCL. Three Hospitals (Govt., BCCL and Private) were selected randomly from each sector; simultaneously, Household Sample was obtained by the multistage random sampling through blocks, sectors and individuals i.e Selection of blocks (Bhuli), then sectors and finally quarter numbers.[25] Bhuli is one of the largest residential areas for workers in India.

The Hospital based samples were interviewed after visiting the study centers during the duration of data collection periods after they had taken the physician appointment. A review of their prescription was done and their consent to participate in the study was obtained. Based on their consent, recruitment of individuals was done. The questionnaires were

translated in Hindi by experts; it was back tested and field tested before implementation.

Data collection was made by two standardized tools: WHO Quality of Life (Bref) questionnaire and Global Physical Activity Questionnaire (GPAQ) which have been standardized and validated in India and from a structured questionnaire which was developed to capture the demographic and general activity information, information on –type of disease, duration of illness, who has recommended him/her for exercise, if they were performing exercises, than if they follow the recommendation, if the disease affected their activity for daily living, family or work participation, or community participation. [26,27] While collecting data, it was observed that many people are not aware what would come under exercise. So they were inquired if they were performing - morning walk, yoga, exercises, jogging, sports, cycling or any other exercise activity. They were also asked if they were regularly performing exercise and the duration of exercise. In the WHO QOL (Bref) questionnaire there was a question about their satisfaction from sexual life, which was not asked to respondents who were single or above 50 years, as this is a very sensitive issue. The same was not inquired from many females either, being only asked from people who are married to people who are up to 45 years old.

To ensure the ethical issues, the researchers obtained approval from the ethical committee, SRM School of Public Health and verbal consent was obtained from the respondents after informing them about the objective and purpose of study. All were assured of anonymity, confidentiality and their ability to withdraw from the interview at any time.

The data analysis was done by SPSS software. The data of 380 individuals was entered in the software, after the data cleaning there was 365 samples left, in which 173 were from the Hospital based data and 192 where household based. This

research assesses how physical inactivity is related to their QOL in people with NCD.

Results:

Mann-Whitney U Test was performed in the demographic profile among the patients attending hospital and household individuals (Table 1). This supports to ensure their significance that the Age and the current illness having the conflict profile since the household based samples are concentrated in less than forty years and the illnesses are lower in the household when compared with the individuals attending hospital.

Table 1: Demographic Profile

		Hospital (n = 173)	Household (n = 192)	Mann-Whitney U (Sig.)
GPAQ Classification	Low	71.4 (62.5, 80.3)	72.8 (64.1, 81.5)	
	Moderate	19.5 (11.7, 27.3)	21.1 (13.1, 29.1)	0.716
	High	09.0 (03.4, 14.6)	06.1 (01.4, 10.8)	
Age	20 – 40	06.0 (01.3, 10.7)	23.1 (14.8, 31.4)	
	40 – 60	71.4 (62.5, 80.3)	53.1 (43.3, 62.9)	
	60 – 80	21.8 (13.7, 29.9)	23.1 (14.8, 31.4)	0.042
	Greater than 80	00.8 (-0.9, 02.5)	00.7 (-0.9, 02.3)	
Gender	Male	75.2 (66.7, 83.7)	64.6 (55.2, 74.0)	0.068
	Female	24.8 (16.3, 33.3)	35.4 (26.0, 44.8)	
Education	School Level	46.6 (36.8, 56.4)	51.0 (41.2, 60.8)	
	Diploma	05.3 (00.9, 09.7)	01.4 (-0.9, 03.7)	
	UG	15.8 (08.7, 22.9)	23.8 (15.5, 32.1)	
	Prof. Degree	03.0 (-0.3, 06.3)	02.0 (-0.7, 04.7)	0.301
	PG	00.0 (00.0, 00.0)	00.7 (-0.9, 02.3)	
	Illiterate	29.3 (20.4, 38.2)	21.1 (13.1, 29.1)	
Occupation	Retired	09.8 (04.0, 15.6)	08.8 (03.2, 14.4)	
	House-Wife	27.8 (19.0, 36.6)	40.1 (30.5, 49.7)	
	Private	18.8 (11.1, 26.5)	17.0 (09.6, 24.4)	
	Shop-Keeper	00.0 (00.0, 00.0)	01.4 (-0.9, 03.7)	0.121
	BCCL	39.8 (30.2, 49.4)	27.2 (18.5, 35.9)	
	Govt	03.8 (00.1, 07.5)	02.7 (-0.5, 5.9)	
	Other	00.0 (00.0, 00.0)	02.7 (-0.5, 5.9)	
Currently Ill	Yes	58.6 (48.9, 68.3)	38.1 (28.6, 47.6)	0.001
	No	41.4 (31.7, 51.1)	61.9 (52.4, 71.4)	
Non Communicable Disease	Any One	66.2 (56.9, 75.5)	66.7 (57.5, 75.9)	
	Any Two	29.3 (20.4, 38.2)	24.5 (16.1, 32.9)	
	Any Three	03.8 (00.1, 7.5)	06.8 (01.9, 11.7)	0.921
	Any Four	00.0 (00.0, 00.0)	00.7 (-0.9, 02.3)	
	All	00.8 (-0.9, 02.5)	01.4 (-0.9, 03.7)	
Performing Exercise	Yes	66.2 (56.9, 75.5)	53.1 (43.3, 62.9)	0.079
	No	33.8 (24.5, 43.1)	46.9 (37.1, 56.7)	
Marital status	Single	03.0 (-0.3, 06.3)	04.8 (00.6, 09.0)	0.546
	Married	97 (93.7, 100.3)	95.2 (91.0, 99.4)	

Duration of Illness	< Six Month	06.0 (01.3, 10.7)	00.7 (-0.9, 02.3)	0.057
	Last One yr	06.8 (01.9, 11.7)	09.5 (03.8, 15.2)	
	One to Two yrs	03.8 (00.1, 07.5)	08.8 (03.2, 14.4)	
	Two to Five yrs	27.8 (19.0, 36.6)	39.5 (29.9, 49.1)	
	Five to Ten yrs	42.1 (32.4, 51.8)	33.3 (24.1, 42.5)	
	Ten to Fifteen yrs	09.0 (03.4, 14.6)	04.1 (00.2, 08.0)	
	> Fifteen yrs	04.5 (00.4, 08.6)	04.1 (00.2, 08.0)	
Salary	Less than 10000	29.3 (20.4, 38.2)	25.9 (17.3, 34.5)	0.243
	10000 - 20000	16.5 (09.2, 23.8)	23.1 (14.8, 31.4)	
	20000 - 30000	20.3 (12.4, 28.2)	28.6 (19.7, 37.5)	
	30000 - 40000	21.1 (13.1, 29.1)	20.4 (12.5, 28.3)	
	40000 - 50000	09.8 (04.0, 15.6)	01.4 (-0.9, 03.7)	
	Above 50000	03.0 (-0.3, 06.3)	00.7 (-0.9, 02.3)	

* Significance at the level of 0.05
**Significance at the level of 0.01

Chi – Square with Fisher exact statistics shows the association of physical activity with the socio – demographic profiles, where the aged people fall in the category of low level of physical activity though the number is small. Similarly the parameters like male, married, school level & illiterates, retired & govt. sector people, more years of illness, non – performance of physical exercises and high earning people were prone to be more physically inactive. There is no impact of current illness on the physical activeness (Table 2). The similar set of profiles was verified with the QOL Classification, which shows the conflicts in the Salary, Education, and Gender.

Table 2 Related Demographic and general information

	Profile	Low	Moderate	High	Total	Sig
Age	20-40	30	18	7	55	
	40-60	160	44	21	225	0.001**
	60-80	70	12	0	82	
	Greater than 80	3	0	0	3	
Marital Status	Single	7	7	1	15	
	Married	256	68	26	350	0.041*
Gender	Male	176	61	17	254	0.021
	Female	88	13	10	111	
Education	School level	116	51	12	179	
	Diploma	7	4	1	12	0.004**

	UG	54	10	9	73	
	Professional Degree	8	1	0	9	
	PG	1	0	0	1	
	Illiterate	78	8	5	91	
Occupation	Retired	31	3	0	34	0.119
	Housewife	79	34	12	125	
	Private	47	14	4	65	
	Shopkeeper	3	0	0	3	
	BCCL	89	23	9	121	
	Gvt	10	0	1	11	
	Others	4	0	2	6	
Currently ill	Yes	131	34	10	175	0.436
	No	133	40	17	190	
Duration of illness	< 6 months	6	3	3	12	0.006
	Last one Year	22	7	1	30	
	One to 2 Year	11	7	5	23	
	2 to 5 Years	88	23	12	124	
	5 to 10 Years	107	25	5	137	
	10-15 Years	19	4	0	23	
	>15 Years	9	7	0	16	
Performing exercise	Yes	163	39	14	216	0.255
	No	99	35	13	149	
Salary	Less than 10000	65	33	3	101	0.001**
	10000-20000	47	12	13	73	
	20000-30000	73	10	7	90	
	30000-40000	59	13	4	76	
	40000-50000	14	4	1	19	
	Above 50000	5	1	0	6	
Total		263	74	28	365	

*Significance at the level of o.o5
**Significance at the level of o.o1

From the data on Quality of Life domains, the total scores were compiled as per instruction of WHO – QOL – Bref guidelines. Total scores were classified as low, moderate and high using the quartiles ($q_1 \leq 22$, $q_3 \geq 25$), which provides that 48.2% of the study population led a good quality life. Likewise, GPAQ classification was done using the guidelines. The study findings alarmingly indicate 72.1% of people are physically inactive in the study population. The QOL and GPAQ have a high significant association ($x^2 = 143.657^{**}$) which shows increase in the physical activity led to good QOL (Table 3).

Table3a: Physical In-activity Prevalence

GPAQ Classification	Frequency	Percent
Low	263	72.1
Moderate	074	20.4
High	028	07.5
Total	365	100.0

Table 3b: Mediation analysis

	Adj.R-Square	Beta	P
Regression[QOL] on [NCD]	0.119	-0.349	0.000 **
Regression [PA] on [NCD]	0.000	0.052	0.318
Regression [QOL] on [PA] controlling for [NCD]	0.144	0.165	0.001**
Beta for [NCD]		-0.357	

17.8% are performing low physical activity and they had low QOL scores. For the mediation analysis, QOL scores are considered as a dependent variable for the NCD (independent) with physical activity as a mediation variable after the standardization. The relationship between the QOL and NCD was highly significant (r = -0.349**), which indicates that the increased severity in NCD will reduce the quality of life. Also, the relationship between the QOL and GPAQ has high significance (r = 0.146**) which indicates that there is a direct relationship between the increase in physical inactivity and the QOL. The physical activity and NCD don't have a significant (r = 0.052) relationship which shows that the NCD is not a confounding factor on the physical activity.

To prove the hypothesis that the physical inactivity acts as a controlling factor for NCDs and has a significant partial relationship with QOL, it is indicated that the physical activity will increase the QOL of the people with NCD (Table 4).

Table 4: Mediation modeling table

Step	IV	DV	r	Std. β	R²	Sig.
1	NCD	QOL	-0.349**	-0.349	0.122	<0.01
2	PA	QOL	0.146**	0.146	0.021	<0.01
3	*NCD*	*PA*	*0.052*	*0.052*	*0.003*	*>0.05*
4	PA NCD	QOL	0.385**	0.165 -0.357	0.149	<0.01

Fig. 1 shows that the mediation model of the fit (R^2 = 0.15) is QOL = - 0.36*NCD + 0.16*GPAQ; RMSEA < 0.05 ensures the goodness of fit, it gives the clear evidence that the increment in the physical activity of people with NCD has an impact on their quality of life.
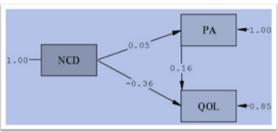

Figure-1.Mediation Modeling

To ensure the mediation, the total effect was calculated as $\beta_{NCD\ (PA)}$ + β_{NCD}= -0.522 + (-0.349) = -0.871, which is higher than the direct effect, it indicates that the physical activity has an impact on the QOL. In addition, the effect of NCD, when controlling factor for PA is zero (β_{NCD} − $\beta_{NCD\ (PA)}$ = -0.349 − (-0.357) = 0.008 ~ 0.00) ensures the physical activity as complete mediator.

Discussion:

The GPAQ shows high correlation between level of physical activity with age ($P < 0.01$) and salary ($P < 0.01$) of the person with NCD. This means that the younger the age the people, the more physically active they are and as ageing progresses, their level of activity decreases.

A difference in perception about their health, when asked if they are currently ill, is seen because of their different perception. There is difference in perception of individuals, who are ill versus who (174) are not ill (190). This is because of the fact that those who are having the new emergence of the disease did not find any difference in their health. People who

had controlled NCDs also felt that they are not ill. People who were performing high level of activity also had the perception that they are not ill, whereas those who had the chronic illness and had less physical activity perceived that they are ill. It is seen that there is a relation between the individual salary and their level of physical inactivity.

Application of the mediation model on the NCDs and QOL implies the significant relation (P < 0.01), whereas when it is applied to the NCDs and physical activity there is no influence in physical activity due to the NCD's; some are very active in their physical activity. However when physical activity is seen in relationship with QOL at P < 0.01, it indicates that there exists a relation between the physical activity and QOL and increase in the physical activity would lead to better QOL of the people.

So far globally there's no study that highlights the linkage between NCDs, physical activity and QOL. This uniquely highlights the importance of how physical inactivity is related to the poor QOL and vice-versa. Now it becomes more important for the clinicians, exercise physiologists as well as the public health professionals to think about how we can increase the level of physical activity in people with and without NCDs. At the same point of time it also opens many grey areas of research on the topic where there is a need to understand the behavioral aspects of physical inactivity/activity in people with NCDs. How to increase their adherence to the recommended physical activity protocol? What are the other areas apart from physical activity that would be affected by poor QOL? Evidence is based interventions for disease specific protocols to increase the QOL. Now it becomes more important for the public health policy makers to plan for the diverse group of people with varied needs and the alarming growing epidemic of physical inactivity. Physical inactivity is not just a phenomenon that is just prevalent in high income countries but it is equally becoming a big issue for the middle countries too.

In addition, the studies from the western world have indicated a high prevalence of physical inactivity. [28, 29, 30] This has led towards designing better policies that help to improve physical activities. So far there are only few researches available on this topic and most of the research indicates a prevalence of more than 52 %. Comparatively this study shows that there is a high level of Physical inactivity (72%) in the people of Dhanbad.

Presently, clinical services are not adequately equipped to provide the required level of care for these NCDs in primary and secondary health-care settings. Therefore, the appropriate strategies should be devised to be implemented under NPCDCS to ensure that the NCDs can be prevented and managed in an effective manner. Policies and plans for facilitation of physical activity levels at all work environment and community settings need to be done. There is a need for the transplantation of the policies in the community.

The present study highlights the high level of physical inactivity (72 %) and its major threat to the population in Dhanbad but it may not be the same scenario of the entire state, other states or at a national level. There may also be a problem in the certain methodology or tool selection, as at the time of study there was no other Indian tool to assess the physical activity level. So the author decided to go along with the GPAQ and WHO- QoL Bref as these are validated and used in some of the earlier researches from India.

Conclusion:

Study shows how Quality of Life was affected by NCDs related to the physical inactivity. Our findings suggest that the physical inactivity level is quite high in people of all age groups and people of both genders. There is a need to develop more programs with focus on the different age groups and also looking at it though the gender lens, socio cultural factors and

religious beliefs. As this research establishes a close link between the improvement of physical activity and better QOL and vice-versa, there is a need for the government, policy makers, clinicians and policy makers and other stake holders to make suitable holistic policies to improve the level of physical activity. In addition to the above facts it also brings about the importance of the urgent need of a national research on the level of physical inactivity in the public health researches.

Author contribution: Author 1 designed the research proposal, selecting appropriate tool, data collection, data analysis and finally the preparation of manuscript. Author 2 has supervised the research as a mentor and has contributed towards the sample selection, research design, data analysis and writing of manuscript.
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