

RESEARCH ARTICLE

PHYSICAL ACTIVITY LEVELS IN PERSONS WITH POST-POLIO SYNDROME- A CROSS SECTIONAL SURVEY ACROSS GUJARAT, INDIA.

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..... Manuscript Info

Abstract

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Key words:-

physical activity, post-polio syndrome, leisure-PA, household-PA, employment-PA, exercise-PA.

..... Background: According to WHO, only 38% of those with disability meet recommendations for physical activity(PA) compared to 49% in healthy individuals.Post-polio syndrome (PPS) is a neuromuscular condition which may develop several years after initial polio infection.Several people with PPS may have difficulties in achieving desired levels of PA because of impairments and activity limitations.Purpose of the study was to determine the level of PA using physical activity and disability survey(PADS).

Methods: In this cross sectional survey, 80 PPS subjects between 18-65 locomotor ability were included;those years, having using psychotrophic drugs, having respiratory/cardiac insufficiency or cognitive impairment were excluded.Demographic details including age, gender, BMI, age at acute polio onset, duration of new symptoms, number of body sites affected and use of assistive devices were documented.Levels of physical activity were then correlated with risk factors such as age, BMI, number of body sites affected and duration of new symptoms.

Results: Participants were active for 70 minutes/day, household-PA being higher with mean score of 24 minutes and 15 seconds/day,followed by leisure time-PA of 23 minutes 15 seconds/day.Employment related activity of 14 minutes 40 seconds/ day and exercise related activity of 10 minutes 30 seconds/day was observed.PA as a whole significantly and negatively correlated with age (*r*=-0.40, p=0.01).

Interpretation: PA levels in PPS maybe high but this is mainly in the form of household and leisure activities contributing to reasonable PA across the day. However, PA correlates with age suggesting the need of structured exercises in form of low PA spread across the day.

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..... Introduction:-

Post-polio syndrome (PPS) is a complex of late onset neuromuscular symptoms with new or increased muscle weakness and muscle fatigability as key symptoms.¹ Common symptoms include fatigue, new muscle weakness in affected muscles as well as previously unaffected muscle and also atrophy of affected muscle groups. Muscle and

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joint pain is seen and it is usually associated with muscle cramps and spasm. Joint pain is similar to arthritis, stiffness and reduced range of motion.²According to the World Health Organization (WHO), PA of 150 minutes per week or as moderate to vigorous PA a minimum of 30 min per day most days of the week is the recommended guideline.³It has been shown that only 38% of adults with a disability meet the international recommendations for PA compared to 49% in those without disability.⁴ Also, levels of PA decline with increasing age. Impairments in PPS such as muscle weakness, muscle fatigue, general fatigue, cold intolerance, and musculoskeletal pain both at rest and during PA can lead to activity limitations, such as reduced walking ability, both indoors and outdoors. This, in turn, can restrict activities of daily living and may lead to a more sedentary lifestyle.⁵

Acute polio is no longer a constant threat to people in the polio-free areas of the world, but there are still thousands of polio survivors who are at risk of developing late manifestations of the disease. Prevalence of PPS among polio survivors was found to be 86% in Gujarat, commonest symptoms being difficulty in walking, joint and muscle pain, muscle weakness and fatigue.⁶Many persons with late effects of polio may have difficulties or are unable to achieve desired levels of physical activity because of their impairments and activity limitations associated with their disability. The impairments following late effects of polio, together with walking limitations, fear of falling, and risk of falls, potentially also affect the possibility to be physically active.⁷ PA is a central component in not only preserving health but also maintaining and improving quality of life. Physical inactivity in disabled population is more common than in general population and hence improving PA behavior in people with disabilities is even more important in order to prevent the hazards of physical inactivity. Knowledge of the amount and type of PA in persons with late effects of polio is very scarce and assessing PA in this population can lead to a better understanding of their lifestyle and enable in creating management strategies for the same. This study intends to determine their physical activity and their correlation with certain risk factors such as age, BMI, number of body sites affected and duration of new symptoms in persons with PPS.

Materials and methods:-

A cross sectional study was conducted over a period of 2 years among community dwelling persons with PPS selected from various clubs, non-government organizations, associations and also from hospitals and their databases in Gujarat, India. Study was approved by Institutional Ethics Committee (IEC-CMPP/01/2017-18), as a part of a bigger study, and was registered in the Clinical Trial Registry of India (CTRI/2017/11/010634).

The study was conducted on a convenience sample of 80 participants, both men and women with PPS according to Halstead criteria (1985).⁸ There should be no other medical explanation found and there should be a gradual or abrupt onset of new neurogenic weakness. Those between 18 to 65 years, having locomotor ability with or without assistive device were included, and individuals who were unable to cooperate due to cognitive impairment, had disabling co-morbidity that influenced the outcome variables, using wheelchair, or if they were using any psychotropic drugs were excluded. Nature and purpose of study was explained to them in the language they could understand, and informed written consent was obtained. A complete neuromuscular examination was done and participants were interviewed and assessed by the principal investigator. They were then assessed for the outcome measures, in a personal interview which lasted for about 20 minutes. Details like age, gender, occupation, Body Mass Index (BMI), working experience, age of onset of acute polio, use of assistive devices, number of body sites affected with residual paresis were also documented. Outcome measures consisted of Physical activity and disability survey (PADS)-Gujarati version.

PADS which is a 31-item self-report questionnaire that provides a measure of the day-to-day level of PA in people with disabilities. It consists of four subscales focusing on exercise, leisure, household activities, work/school, and a part describing whether they received therapy or used a wheelchair. Data were then converted into minutes per day for each subscale and used to calculate the sum score of PADS. The original PADS has shown good psychometric properties, and has been used in persons with multiple sclerosis, arthritis, stroke and late effects of polio.⁹ For an accurate measurement, local linguistic versions of PADS in Gujarati language, translated as per the guidelines of WHO, having internal consistency of 0.84 was used.¹⁰ IBM SPSS version 20.0 was used for analysis and significance level was assigned at 5%. Descriptive statistics were obtained for age, gender, BMI and other measures assessed in self-structured survey questionnaire. Normal distribution was checked using histograms and KS test, and appropriate test of correlation analysis was then applied.

Results:-

Out of 87 participants with PPS, 80 fulfilling the inclusion criteria were selected and other 7 were excluded. There were 56 men and 24 women, of which, 69 were married and 11 were single/divorced/widowed. Mean age, BMI, duration of new symptoms, are shown in table 1. Sixty-eight (85%) participants were using some or the other assistive device for mobility, and only 12 (15%) were independent. None had any history of recent surgical procedures. Age of onset of acute polio was less than 1 year in 30 participants, between 1 to 2 years in 26 participants, between 2 to 3 years in 20 participants and more than 3 years in 4 participants. Thirty-four participants had associated medical conditions, for which they were under prescribed medications, of which 17 had hypertension, 5 had dyslipidemia and 6 each had diabetes and hypothyroidism. Figure 1 shows the distribution of participants based on the number of body sites affected.

Variable	Mean <u>+</u> SD	95% CI	
Age	41.02 <u>+</u> 8.41	25 - 60	
BMI	22.74 <u>+</u> 2.63	17.5 - 30	
Duration of symptoms	10.6 <u>+</u> 4.35	5-20	

Table 1:-Descriptive statistics of demographics



Participants were physically active for 70 minutes per day and detailed scores of PADS on each subscale as well as sum score is represented in table 2. They were physically more active in household activity, followed by leisure time, employment related activity and exercise related activity. None of the participants received physiotherapy/occupational therapy, hence it has been omitted for analysis. And those using wheelchair (n=7) were excluded, hence this was also omitted for analysis.

Table 2:-Descriptive statist	cs of subscale and sum sco	ore of Physical Activity (PA)

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	Exercise	Leisure	Household	Employment	Total		
Mean	10 mins	23 mins	23 mins	14 mins	70 mins		
	15 secs	15 secs	15 secs	40 secs	15 secs		
SD	10 mins	5 mins	7 mins	8 mins	15 min		
	45 secs	45 secs	45 secs	20 secs	45 sec		

Pearson's test of correlation was applied to find the correlation between age and physical activity, and between BMI and physical activity. Duration of symptoms and number of body sites were also correlated with physical activity, using spearman's correlation. Table 3 shows the details of correlational analysis such as correlation coefficients and p-values.

		Age		BMI		Duration		Number	
No.	PADS	r	р	r	р	rho	р	rho	р
1.	Exercise	-0.35*	0.002	-0.05	0.67	0.22	0.06	-0.21	0.06
2.	Leisure	-0.04	0.79	0.14	0.24	-0.03	0.77	0.02	0.85
3.	Household	-0.22	0.04	0.07	0.51	0.20	0.19	-0.06	0.56
4.	Employment	-0.16	0.17	-0.12	0.32	-0.12	0.33	-0.19	0.08
5.	Total	-0.40*	0.01	-0.16	0.15	-0.06	0.56	-0.18	0.12

Table 3:-Correlational analysis of PA with age, BMI, duration of symptoms, number of body sites affected

*Significant at level of significance 0.05

Discussion:-

In the present study, subjects were found to be physically active for 70 minutes per day as measured using PADS, and household activity had a mean score of 24 minutes and 15 seconds/day, followed by leisure time activity of 23 minutes 15 seconds/day, employment related activity of 14 minutes 40 seconds/ day and exercise related activity of 10 minutes 30 seconds/day. According to the WHO guidelines, at least 150 minutes per week is recommended inclusive of household chores but they have to be at least moderate in intensity and performed in bouts of at least ten minutes in order to be beneficial for health.³ In this study also, participants were physically active for 70 minutes/day, and were more active in household activity with mean score of 24 minutes/day. Although they were physically active, most of this was performed in household and leisure domains, and not as structured exercises. In a similar study by Winberg C et al on PA in PPS, participants met the WHO recommendations 43% of the participants were active more than 30 min per day, but in the exercise and leisure activities, which is in contrast to the current study where PA was more in household and leisure.¹¹ Previously, widely varying rates of total physical activity time using PADS have been reported in persons with different disabilities. In a stroke population, 27 minutes/day of physical activity was reported.¹² People with osteoarthritis reported a mean score of 186 minutes/day on physical activity.¹³

Active and healthy lifestyle is recommended in disabled persons, but due to their disability they may not be able to participate and achieve desired levels of moderate physical activity. Instead, they may have to engage in lower doses of activity in order to maintain an active lifestyle and relatively less in impairment and activity limitation.¹⁴ People with disabilities are known to have one of the highest rates of physical inactivity, which predisposes them to a number of potential health issues including increased risk of falls, musculoskeletal, cardiovascular and metabolic comorbidity.¹⁵ However, in contrast to this understanding, participants were active for 70 minutes each day.

Another significant finding in the current study was that age also significantly and negatively correlated with PA as a whole (r=-0.40, p=0.01) suggesting that increase in age correlates with an overall decline in PA. Also, exercise related physical activity also significantly and negatively correlated with age (r=-0.35, p=0.002). Klein MG et al in another study, compared perceived and actual activity levels in 65 persons with late effects of polio during a 3-year period.¹⁶ They concluded that physical activity as measured using PASE scores were inversely associated with age at enrollment in the control group and also decreased with time in study. Hammarlund et al previously reported in a study that ageing persons with late effects of polio experienced a considerable impact of the new and increased impairments on their life situation and on their ability to perform daily activities.¹⁷Increasing age predisposes the individuals to various degenerative problems, resulting into overall sedentary behavior. But participants in the current study were relatively younger (mean \pm SD=41.04 \pm 8.41) which suggests that physical activity was higher due to lower age group. Other risk factors such as BMI, duration of symptoms and number of body sites affected did not have a significant correlation with any domains of physical activity or total physical activity. This is in contrast to studies which conclude that age and BMI were independent predictors of daily step activity among controls but not for either of the post-polio groups.¹⁸ This finding can also be attributed to younger age of participants in the current study.

The study has a few limitations. Although PADS used for assessing physical activity is a valid and reliable tool to assess PA in disabled people, using a pedometer or accelerometer is considered a gold standard measure. Wheelchair bound subjects were not analyzed and hence the findings cannot be generalized to an entire population of persons with PPS. And future studies with a varied PPS population can be undertaken.

Conclusion:-

Physical activity levels in PPS are high, and mainly in the form of household and leisure activities contributing to fairly reasonable physical activity across the day. However, they do not consist of structured exercises which are better suited to them based on their physical impairments and nature of condition. Physical activity also moderately correlates with age, highlighting the need of appropriate intervention strategies to alleviate the health status as one ages with post-polio syndrome.

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Declaration of interest:

Authors declare no conflict of interest.

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