

RESEARCH NOTE

Percent Change in Grip Strength of Potato Growers Involved in Potato Cultivation Activities

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ABSTRACT

Grip strength in a general term used/referring to the muscular power and force that a person can generate with his hands. It is the force applied by the hand to pull on or suspend from objects and is a specific part of hand strength. Changed in Grip strength or grip fatigue for selected potato cultivation activities was measured in terms of percentage change in grip strength while performing selected potato cultivation activities. More the reduction in grip strength, more was taken as grip fatigue. Present study entitled "percent change in grip strength of potato growers involved in potato cultivation activities". Multistage purposive random sampling technique was followed to select the state, district, blocks and finally respondent. Total sample size 160 respondents were randomly selected for final data collection. Experimental was conducted on 20 per cent physically i.e. 32 fit. Reduction in grip strength was highest for left hand while performing digging activity also reduction was highest for right hand while performing weeding activity and for both hands while performing earthing activity for respondents of 25-40 years of age. In case of respondents of 41-55 years of age, reduction was highest while performing weeding activity for left, right and both the hands.

Key words: Grip Strength; Potato cultivation activities; Experimental study;

Potato (*Solanum tuberosum* L.) is a third most important food crop, grown in more than 150 countries in the world. World acreage of potato is 18.2 million hectares with average productivity of 17.2 tonnes per hectare. At present, India rank 2nd after China with 48 million tonnes of potato production and average yield is 23.6 tonnes per hectare (L. Singh et al., 2020). Agriculture in the state is characterized by limited use of modern techniques and low productivity. Majority of the agrarian population of the region are marginal farmers following subsistence agriculture (Sanchita Roy et al., 2016). U.P. is the major potato growing state in India followed by West Bengal and Bihar with the production of 10455.30, 7482.30 and 1720.20 thousand tonnes, respectively. The highest productivity of the crop is in West Bengal followed by Gujarat. In respect to Uttar Pradesh, Kannauj district is the highest producer of potato followed by Farrukhabad and Agra with the production of 942299, 832744 and 647025 metric tonnes

and are being 34595, 29793 and 18156 hectares, respectively. But in average productivity (q./ha) district Agra first having place (356.37) followed by Mathura (339.37 q/ha) and Rampur (336.49 q/ha) (Anonymous 2001-2002). Uttar Pradesh is the largest producer of potato in India, accounting for more than 32 per cent of the country's total potato production. In the year 2010-2011, the National Horticulture Board (NHB) had recorded potato production in Uttar Pradesh at 135.76 lakh tones, which was marginally higher than West Bengal's figure of 133.91 lakh tones (Anonymous 2010-2011). Potato cultivators carry out different types of agricultural activities related to potato cultivation like ridge making, planting, weeding, digging and earthing with considerable amount of manual and rigorous tasks. However numbers of studies have classified farming as a risky and hazardous job (Osborne et al., 2010 and Holmberg et al., 2002). In potato cultivation involvement of hand muscles is more along with this

workers used different types of tools which may not suits to their hand anthropometry. This may affect their muscular stress while performance and reduce their efficiency.

Dewangan et al. (2010) assessed impact of aging over grip strength and found that muscular strength was the highest for the right leg (363.2 N) and the lowest for the left hand push strength (112.4 N). A comparison of mean values indicated that the right handgrip strength was 15.1% higher than the left handgrip strength. The right hand push strength was 4.7 per cent higher than the left hand push strength, and the right hand pull strength was 4.9 per cent higher than the left hand pull strength. The push and pull strengths as well as the leg and foot strengths were significantly ($p < 0.01$) different, muscular strength decreases with increasing age.

METHODOLOGY

Multistage purposive random sampling design was followed for the selection of study area and respondents. The stages included selection of locale, selection of blocks, selection of village and selection of respondents for sampling design.

District Kannauj (U.P.) was selected purposively for the present study because potato is one of the major crops of this district. This is selected because of investigators convenience.

District Kannauj was divided into 8 blocks. Out of these 8 blocks only two blocks namely kannauj and Jalalabad were selected randomly.

Two villages from each selected block i.e. Basirapur and Mahmoadpur paith from Kannauj and Badlepurwa and Kheda from Jalalabad block were randomly selected for the study.

Forty potato growers were randomly selected from each village. Thus sample comprises of 80 respondents from each block. The total sample comprises of 160 respondents for the present study. Experimental study was conducted on 32 (20% of the total sample size) physically fit respondents from the total sample. Physical fitness was assessed through BMI.

The task of data collection begins after a research design has been planned and carried out the data was collected from October to March; 2015.

Experimental data collected various parameters and recorded i.e. height and weight of potato growers,

BMI, grip strength while performing potato cultivation activities. The instruments used to collect the data i.e. weighing .

Change in grip strength : Grip strength of selected farm women's was assessed by grip dynamometer. The subjects were asked to pull the handle before and after the work i.e. in morning at start of the activity and at afternoon before they were leaving for lunch with left right and both hands and readings given in dial in Kgs. were recorded. The percentage reduction in grip strength was calculated from the following formula:-

$$\% \text{change in grip strength} = \frac{S_r - S_w}{S_r} \times 100$$

The data collected were processed and analyzed by appropriate statistical techniques, simple statistics like frequency, percentage, average and simple arithmetic mean and other complex multivariate techniques Body mass index (BMI), Mean, Standard deviation and Correlation coefficient (r).

RESULTS AND DISCUSSION

Earthing : Data related to per cent reduction/change in grip strength was displayed in table 1 revealed that maximum 20.44 percent reduction in grip strength was observed in right hand of respondents from 25-40 years of age followed by 14.52 per cent reduction was recorded in both the hands while performing earthing activity, whereas reduction in left hand was 14.21 per cent. In case of respondents from 41-55 years of age group, per cent reduction at was quite higher than the respondents of 25-40 years of age, maximum 36.43 per cent reduction in grip strength of right hand was recorded while for left and both the hands it was 28.94 and 27.30 per cent respectively.

Weeding : It is also explicit from the table 4.4.2 that maximum 36.87 per cent reduction in grip strength was observed in respondents from 41-55 years of age on performance of weeding activity while for left and both the hands it was recorded 28.94 per cent and 27.30 per cent respectively. For the respondents of 25-40 years of age maximum reduction was also for the right-hand but it was quiet less i.e. 20.77 per cent. In case of left and both the hands 13.46 per cent and 13.34 percent reduction in grip strength was recorded while performing weeding activity.

Digging : Out of all three activities most tiring activity

Table 1. Percent Change in Grip Strength of Potato Growers Involved in Potato Cultivation Activities (N=32)

| Activities | 25-40 years (n=16) | | | 41-55 years (n=16) | | |
|------------|------------------------|-------------------------|------------------------|------------------------|-------------------------|------------------------|
| | Left Hand (Mean±SD) | Right Hand (Mean±SD) | Both Hand (Mean±SD) | Left Hand (Mean±SD) | Right Hand (Mean±SD) | Both Hand (Mean±SD) |
| Earthing | 14.21 ±03.93 | 20.44 ±04.81 | 14.52 ±03.45 | 28.94 ±03.15 | 36.43 ±03.62 | 27.30 ±02.83 |
| Weeding | 13.46 ±04.35 | 20.77 ±05.83 | 13.34 ±04.20 | 26.48 ±05.41 | 36.87 ±07.74 | 28.14 ±05.39 |
| Digging | 15.61 ±03.90 | 15.75 ±05.48 | 12.93 ±03.54 | 24.84 ±06.82 | 39.63 ±07.83 | 26.49 ±07.21 |

Table 2. Correlation Coefficient between Grip Strength and Selected Independent Variables.

| Variables | Earthing | | | Weeding | | | Digging | | |
|-----------|----------|---------|---------|---------|---------|---------|---------|---------|---------|
| | Left | Right | Both | Left | Right | Both | Left | Right | Both |
| Age | 0.3521* | 0.3716* | 0.3660* | -0.0613 | -0.2338 | -0.2191 | 0.3972* | 0.4112* | 0.3663* |
| BMI | 0.3758* | 0.3793* | 0.3582* | 0.0512 | 0.1813 | 0.1162 | 0.2271 | 0.3730* | 0.1815* |

*Significant at 5% level of Significant, ** Significant at 1% level of Significant

in terms of grip fatigue observed for the respondents of 41-55 years of age was digging activity i.e.. 39.63 per cent in right hand followed by 26.49 per cent in both the hands while, 24.84 per cent in left hand was recorded in digging activity.

For respondents of 25-40 years of age group digging was not much tiring, reduction in grip strengths of the respondents from 25-40 years of age group was less comparing with other two activities In digging activity, 15.75 per cent reduction in right hand and 15.61 per cent in left hand was observed while for both hand it was 12.93 per cent. Finding of the study are in agreement with finding of *Dewangan et al (2010)* found that muscular strength was the highest for the right leg (363.2 N) and the lowest for the left hand push strength (112.4 N). A comparison of mean values indicated that the right hand grip strength was 15.1% higher than the left handgrip strength. The right hand push strength was 4.7% higher than the left hand push strength, and the right hand pull strength was 4.9% higher than the left hand pull strength. The push and pull strengths as well as the leg and foot strengths were significantly ($p < 0.01$) different, muscular strength decreases with increasing age.

There is positive significant relationship was found between selected independent variables and reduction in grip strength while performing cultivation activities. No significant relation has been observed between age and reduction in grip strength while performing earthing

activity though negative but not significant relation in grip strength of left, right and both the hands was observed. 'r' values are positive for digging activity showing positive significant relationship between age and reduction in grip strength while performing digging activity. But in case of BMI Positive significant correlation was observed between age and change in grip strength for left, right and both the hands while performing earthing activity. Hence 'r' values are not significant for Change in grip strength and BMI while performing weeding and for left hand while performing digging. Positive significant correlation was also found for reduction in right and both the hands while performing digging activity. Significant values shows significant relationship meaning to say as the independent variables increase or decrease the dependent variable also increase or decrease in same manner. On the basis of result of correlation coefficient the null hypothesis was rejected.

CONCLUSION

Reduction in grip strength was highest for left hand while performing digging activity also reduction was highest for right hand while performing weeding activity and for both hands while performing earthing activity for respondents of 25-40 years of age. In case of respondents of 41-55 years of age, reduction was highest while performing weeding activity for left, right and both the hands. No significant relation was found between

age and reduction in grip strength while performing earthing and weeding activity also negative significant relation was observed between right hand and age while performing digging activity. BMI was negatively correlated with left right and both the hands while

performing weeding and earthing activity respectively. Use of finer muscles was more in potato cultivation activity along with this use of traditional tools add to the drudgery therefore contribute their part in muscular stress.

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