

## ORIGINAL ARTICLE

## IJPHY ANALYSIS OF POWER GRIP AND PINCH GRIP AMONG HEALTH CARE PROFESSIONALS

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## ABSTRACT

**Background:** Grip and pinch strength are commonly employed indices of strength used in hand evaluations. Pinch grip and power grip strengths are used as indices of strength in hand therapy assessments. For all professions grip strength is an important criterion to be successful in their profession. Such phenomena may be explained by differences in nature of work, working environment, and objects workers handle.

**Method:** 200 healthy subjects, satisfying the selection criteria were included and assessed with standardized procedure for power grip and pinch grip (lateral pinch, pad-pad, and tip-tip) strength. They were divided in four groups, 50 group each according to profession i.e. medical surgeons, dentist, physiotherapists and nurses.

**Results:** The mean power grip strength shows highly significant difference between medical vs. dental ( $p > 0.01$ ) and medical vs. physiotherapy group ( $p > 0.05$ ). The mean lateral pinch strength shows there is highly significant difference ( $p < 0.001$ ) between dental vs. nursing profession and dental vs physiotherapy group. No significant difference among other groups.

The mean pad-pad pinch strength shows there is significant difference between dental vs. nursing ( $p < 0.05$ ) and dental vs. physiotherapy group ( $p < 0.05$ ). The mean Tip-Tip pinch strength shows there is significant difference between dental vs nursing profession ( $p < 0.05$ ) and dental vs. physiotherapy ( $p < 0.05$ ). No significant different among other groups.

**Conclusion:** Surgeons have highest power grip strength followed by Nursing, Physiotherapy and Dental professionals. Dentists have the maximum pinch strength in all three positions, followed by Surgeons, Nurses and Physiotherapists. Surgeons have maximum pinch strength next to Dentists.

**Keywords:** Surgeons, Nurses, Physiotherapists, Grip Strength, Pinch Strength, Dynamometer

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## INTRODUCTION

Hand is a much more than a machine in the factory of human body. The hand is irreplaceable when it comes to performing any kind of movement be it gross or skilled [1]. Grip and pinch strength are commonly employed indices of strength used in hand evaluations [2]. The importance of hand strength and function is evident in all aspects of our daily livings, from eating and maintaining personal hygiene to key boarding at the computer, performing surgery, or playing tennis or the piano [3]. Hand strength has been identified as an important factor predicting the musculoskeletal diseases. In addition to its predictive value grip strength and pinch strength are considered to be “objective” outcome parameters and are used to quantify outcome after orthopaedic interventions [4]. Hand function has reported increased difficulty in performing every day task is due to decline in hand function [5]. Grip strength is also a common assessment in medicolegal examinations and, by comparison with the uninjured side, can provide objective evidence of residual hand disability [5].

Grip strength measurement is one of the standard features of patient examination in a hand clinic [6]. Pinch grip and power grip strengths have been used as indices of strength in hand therapy assessments [7]. Grip strength has been used to assess general strength in order to determine work capacity, for extent of injury and disease processes and the potential for progress in rehabilitation [8]. It is prominently accepted that grip and pinch strength measurements provide an objective index of the functional integrity of the upper extremity [9]. Grip strength is correlated with the strength of the upper extremity, general strength of the body and therefore is often adopted in clinical practice as an objective measure of upper extremity function [10]. It is one of the best indicators of the overall strength of the limb [11].

These parameters are often used to assess progress during rehabilitation and need for further physiotherapy. Hand strength evaluation is very important in determining the effectiveness of various surgical or treatment procedure [12]. Increases in power grip, pinch grip and pinch strength for normal subjects 8-19 years, coincide with increase in chronological age and males are stronger than females in all age groups. The dominant hand has 10% greater grip strength than the non- dominant hand [13]. There is a significant difference in grip and pinch strength of different occupational workers [14].

The gripping strength of these muscles may vary from one professional to another Surgeon, Dentist, Physiotherapist, Nurse etc. Orthopaedic surgery can be a physical occupation requiring a strong grip on hand operated instruments, so high grip strength is perhaps not surprising [15]. Dentist are required to maintain a high-level of precision during dental prophylaxis, especially manual scaling, involving high levels of force and precision in order to remove hard calculus from the relatively small area of the tooth's surface. They need repetitive forceful pinching or

gripping, sustained non-neutral wrist positions, and use of vibrating tools.eg, periodontal scaling and root planning possess [16]. Physiotherapist needs good grip strength to do patients mobilization, manipulation, transferring and ambulation. Nursing profession need grip to transfer the patients, lift the patient and for injecting the patient.

The hand strength may vary significantly according to occupation, certain degree of grip strength is necessary for a professional to be successful in his profession. Grip strength and pinch strength are important factors in planning and evaluation of rehabilitation goals and outcomes. So the purpose of this study is to understand the demand level of hand use for the benefit of hand rehabilitation. Need of the study is to analyse the power grip and pinch grip of the dominant hand among health care professionals. To understand the demand level of hand use for the benefit of hand rehabilitation.

Aim of this study was to determine the effect of occupation on power grip and pinch strength of dominant hand among (1) Medical surgeons (2) Dentist (3) Physiotherapist and (4) Nurses.

Objectives of the study were to analyse difference in the power grip and pinch grip of dominant among health care professionals and to Compare power grip and pinch grip of the dominant hand among health care professionals.

## METHODOLOGY

This study was conducted in health care professionals groups, age ranging from 27-50 years. Prior to the participation in this study the subjects were explained about the study and informed consent was taken. The subjects were assessed for inclusion and exclusion criteria and those fulfilled the criteria were included in the study. Subjects were Health care professionals which includes medical, dental, physiotherapy and nursing in Mangalore hospitals. Sample size was 200 subjects (50 in each group). Inclusion criteria: Healthy subjects, Age group between 25-50 years, practicing surgery for last 1 year, Normal muscle strength and ROM of upper-limbs, Willingness to take part in study. Exclusion criteria: Cervical spine pathologies, Congenital anomalies in upper limb, Upper limb trauma/injury in the past 6 months without recovery, Neurological conditions, unco-operative individuals. Materials used were Jamar dynamometer, Pinch meter, Chair, Data sheet, Subject Performa. Study design selected was Cross sectional and sampling method Convenience sampling.

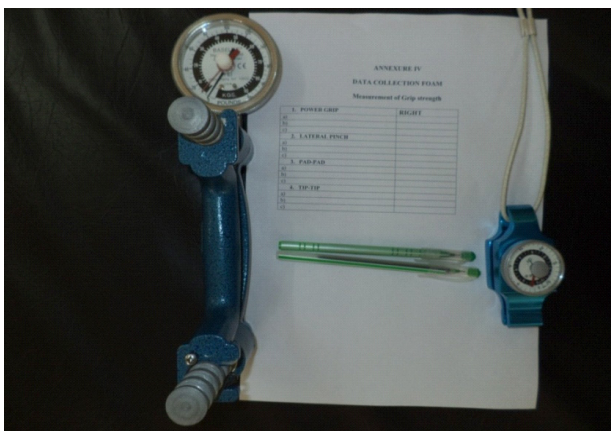
## PROCEDURE

All the subjects were right-handed male volunteers. All measurements were made by one observer to minimize interpreter variability. For each subject, the power grip strength was measured first using the Jamar™ accessory for measuring power grip set at level II to generate maximum grip[17]. This was followed by measurement of the pinch using the pinch meter accessory. Both the dynamometer and pinch device were reset to zero prior to each reading And were read to the nearest increment of the

two scale divisions. The power grip and pinch strength was measured in pounds. Hand dominance was determined by asking: "Are you right-handed or left-handed" If the subject was unsure, the hand used to feed and write decided handedness. 200 healthy subjects, satisfying the selection criteria were included in the study. A written consent form was taken from the subjects. They were then divided into four groups 50 group each. The 4 groups were (1) medical surgeons (2) dentist (3) physiotherapist (4) nurses.

Subjects were seated with their hips and knees flexed at 90° and their feet flat on the floor. All subjects made to sit with their shoulder adducted and neutrally rotated, elbow flexed to 90°, forearm in the mid-prone position and wrist in slightly extended and ulnar deviated position for optimal performance in both power grip and pinch grip [18]. Subjects are allowed to familiarize themselves with each instrument by one submaximal practice trial. Power grip strength is tested first using the Jamar™ dynamometer on the dominant hand. Subjects are instructed to squeeze as hard as possible. Same procedure is repeated thrice. The mean of three recording is taken. Each subject is instructed to squeeze for 3 seconds and then to break for 3 seconds before the next squeeze. Pinch grip was then followed by using the pinch meter, the test sequence of which was essentially identical to that of the power grip test. These readings are recorded after giving the subject a 2 minute break post Jamar dynamometer tests to avoid fatigue [18].

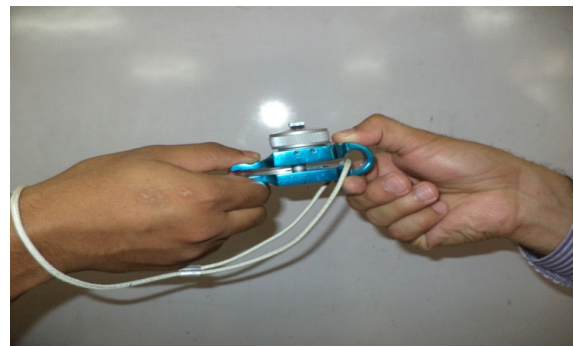
**Figure 1:** Tools used for study



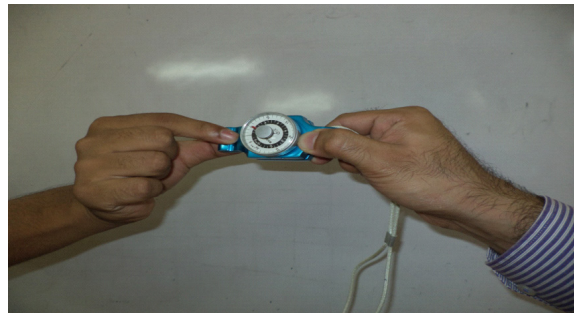
**Figure 2:** Measurement of power grip



**Figure 3:** measurement of lateral pinch



**Figure 4:** Measurement of pad-pad pinch.



**Figure 5:** measurement of tip-tip strength



## RESULTS

### Statistical analysis

Data was statistically analysed using Anova. P value of less than or equal to 0.05 was considered significant. Mean and standard deviation of power grip and pinch were calculated in each group in addition the mean difference between the groups was calculated. The statistical significance was done using SPSS (version 17 SPSS Inc)

Two hundred males aged 27–47 years old were recruited for the study. Table 1 shows their demographic data.

**Table 1:** Demographic Data of Subjects

	Surgeons (n=50)	Dentist (n=50)	Physio-therapist (n=50)	Nurses (n=50)
Gender	All males	All males	All males	All males
Mean age, yr (range)	34.9 (28-47)	35.4 (28-46)	33.9 (27-46)	32.4 (27-42)
Mean body weight, kg (range)	72.0 (57-78)	71.6 (65-82)	70.0 (56-76)	72.6 (60-78)

**Table 2:** Mean Power grip strength and standard Deviation

Profession	Mean	Standard Deviation
Surgeons(n=50)	87.801.50	14.61
Dentist(n=50)	79.451.89	13.39
Physiotherapist (n=50)	80.961.28	9.09
Nurses(n=50)	81.792.05	14.52

Table 2, shows that the mean power grip for surgeons is 87.801.50 and standard deviation of 14.61, for dentist the mean power grip strength is 79.451.89 and standard deviation of 13.39, for physiotherapist the mean power grip strength is 80.961.28 and standard deviation of 9.09, for nurses the mean power grip strength is 81.792.05 and standard deviation of 14.52.

**Table 3:** Shows Power grip Strength between Groups

Groups		Mean Difference	P Value
Surgeons (87.80)	Dentists (79.45)	8.35	P<0.01 (HS)
Surgeons (87.80)	Nurses (81.79)	6.01	P>0.05 (NS)
Surgeons (87.80)	Physiotherapist (80.96)	06.84	P<0.05 (SIG)
Dentist (79.45)	Nurses (81.79)	-2.34	P>0.05 (NS)
Dentist (79.45)	Physiotherapy (80.96)	-1.51	P>0.05 (NS)
Nurses (81.79)	Physiotherapy (80.96)	0.83	P>0.05 (NS)

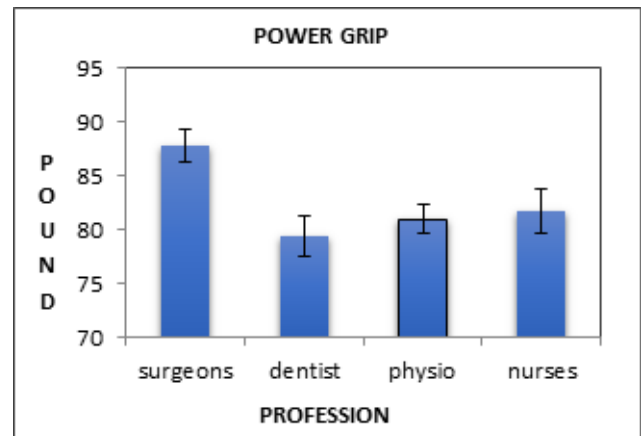
In table 3 shows power grip strength between groups is estimated. The surgeons having mean power drip strength of 87.80 compared with dentist having mean power drip strength of 79.45 which had a mean difference of 8.35 with p value P<0.01 which is highly significant. The surgeons having mean power drip strength of 87.80 compared with nurses having mean power grip strength of 81.79 which had a mean difference of 6.01 with p value P>0.05 which is not significant.

The surgeons having mean power drip strength of 87.80 compared with physiotherapist having mean power grip strength of 80.96 which had a mean difference of 6.84 with p value P<0.05 which is significant. The Dentist having mean power drip strength of 79.45 compared with nurses having mean power grip strength of 81.79 which had a mean difference of -2.34 with p value P>0.05 which is not significant.

Dentist having mean power drip strength of 79.45, compared with physiotherapist having mean power grip strength of 80.96 which had a mean difference of 1.51 with p value P>0.05 which is not significant. The Nurses having mean power drip strength of 81.79, compared with physio-

therapist having mean power grip strength of 80.96 which had a mean difference of 0.83 with p value P>0.05 which is not significant.

**Graph 1:** Shows difference in mean power grip strength between professions



### Pinch Strength

In this study three pinch strength were taken lateral pinch, pad-pad pinch and tip-tip pinch strength.

#### Lateral Pinch

Table 4, shows that the mean lateral pinch strength for surgeons and standard deviation of lateral pinch in each professions.

**Table 4:** Mean lateral pinch strength and standard Deviation.

Profession	Mean	Standard Deviation
Surgeons (n=50)	17.980.42	3.02
Dentist (n=50)	18.680.41	2.91
Physiotherapist (n=50)	16.570.37	2.68
Nurses (n=50)	16.860.37	2.66

Table 4, shows that the mean lateral pinch strength for surgeons is 17.980.42 and standard deviation of 3.02, for dentist the mean lateral pinch strength is 18.680.41 and standard deviation of 2.91, for physiotherapist the mean lateral pinch strength is 16.570.37 and standard deviation of 2.68, for nurses the mean lateral pinch strength is 16.860.37 and standard deviation of 2.66.

**Table 5:** Lateral Pinch Strength between Groups

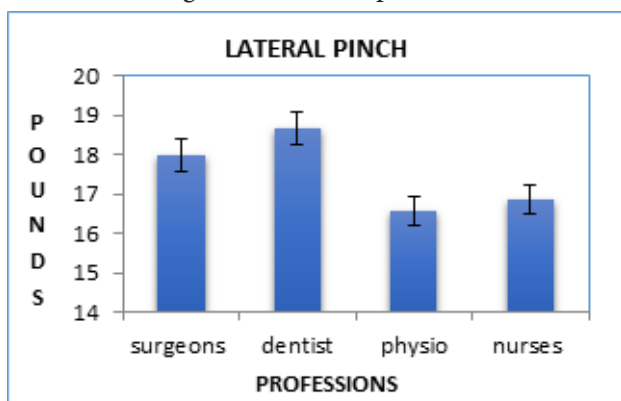
Groups		Mean Difference	P Value
Surgeons (17.98)	Dentists (18.68)	-0.7	p>0.05 (NS)
Surgeons (17.98)	Nurses (16.86)	1.12	p>0.05 (NS)
Surgeons (17.98)	Physiotherapy (16.57)	1.41	p>0.05 (NS)
Dentist (18.68)	Nurses (16.86)	1.82	P<0.01 (HS)
Dentist (18.68)	Physiotherapy (16.57)	2.11	P<0.01 (HS)
Nurses (16.86)	Physiotherapy (16.57)	0.29	p>0.05 (NS)

In table 5 shows lateral pinch strength between groups is estimated. The surgeons having mean lateral pinch strength of 17.98 compared with dentist having mean lateral pinch strength of 18.68 which had a mean difference of -0.7 with p value  $p > 0.05$  which is not significant. The surgeons having mean lateral pinch strength of 17.98 compared with nurses having mean lateral pinch strength of 16.86 which had a mean difference of 1.12 with p value  $P > 0.05$  which is not significant.

The surgeons having mean lateral pinch strength of 17.98 compared with physiotherapist having mean lateral pinch strength of 16.57 which had a mean difference of 1.41 with p value  $p > 0.05$  which is not significant. The Dentist having mean lateral pinch strength of 18.68 compared with nurses having mean lateral pinch strength of 16.86 which had a mean difference of 1.82 with p value  $P < 0.01$  which is highly significant.

Dentist having mean lateral pinch strength of 18.68, compared with physiotherapist having mean lateral pinch strength of 16.57 which had a mean difference of 2.11 with p value  $P < 0.01$  which is highly significant. The Nurses having mean lateral pinch strength of 16.86, compared with physiotherapist having mean lateral pinch strength of 16.57 which had a mean difference of 0.29 with p value  $P > 0.05$  which is not significant.

**Graph 2:** shows difference in the mean lateral pinch strength between the professions



### Pad-Pad

Table 6, shows that the mean Pad-Pad pinch strength and standard deviation for each profession.

**Table 6:** Mean pad-pad pinch strength and standard deviation

Profession	Mean	Standard Deviation
Surgeons(n=50)	14.330.33	2.38
Dentist(n=50)	15.200.37	2.66
Physiotherapist (n=50)	13.770.33	2.37
Nurses(n=50)	13.840.29	2.06

Table 6, shows that the mean Pad-Pad pinch strength for surgeons is 14.330.33 and standard deviation of 2.38, for dentist the mean Pad-Pad pinch strength is 15.200.37 and standard deviation of 2.66, for physiotherapist the mean pad-pad pinch strength is 13.770.33 and standard deviation of 2.37, for nurses the mean pad-pad pinch strength is 13.840.29 and standard deviation of 2.06.

tion of 2.37, for nurses the mean pad-pad pinch strength is 13.840.29 and standard deviation of 2.06.

**Table 7:** shows pad-pad pinch strength between groups is estimated.

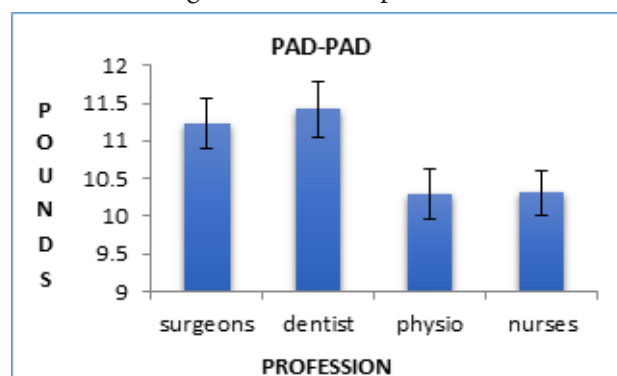
GROUPS		Mean Difference	P Value
Surgeons (14.33)	Dentists(15.20)	-0.87	$p > 0.05$ (NS)
Surgeons (14.33)	Nurses(13.84)	0.49	$p > 0.05$ (NS)
Surgeons (14.33)	Physiotherapy (13.77)	0.56	$p > 0.05$ (NS)
Dentist (15.20)	Nurses (13.84)	1.36	$P < 0.05$ (Sig)
Dentist (15.20)	Physiotherapy (13.77)	1.43	$P < 0.05$ (Sig)
Nurses (13.84)	Physiotherapy (13.77)	0.07	$p > 0.05$ (NS)

In table 7, shows pad-pad pinch strength between groups is estimated. The surgeons having mean pad-pad pinch strength of 14.33 compared with dentist having mean pad-pad pinch strength of 15.20 which had a mean difference of -0.87 with p value  $p > 0.05$  which is not significant. The surgeons having mean pad-pad pinch strength of 14.33 compared with nurses having mean pad-pad pinch strength of 13.84 which had a mean difference of 0.49 with p value  $P > 0.05$  which is not significant. .

The surgeons having mean pad-pad pinch strength of 14.33 compared with physiotherapist having mean pad-pad pinch strength of 13.77 which had a mean difference of 0.56 with p value  $p > 0.05$  which is not significant. The Dentist having mean pad-pad pinch strength of 15.20 compared with nurses having mean pad-pad pinch strength of 13.84 which had a mean difference of 1.36 with p value  $P < 0.05$  which is significant.

Dentist having mean pad-pad pinch strength of 15.20, compared with physiotherapist having mean pad-pad pinch strength of 13.77 which had a mean difference of 1.43 with p value  $P < 0.05$  which is significant. The Nurses having mean pad-pad pinch strength of 13.84, compared with physiotherapist having mean pad-pad pinch strength of 13.77 which had a mean difference of 0.07 with p value  $P > 0.05$  which is not significant

**Graph 3:** Shows difference in the mean Pad-Pad pinch strength between the professions



## Tip-Tip

Table 8, shows that the mean Tip-Tip pinch strength and standard deviation of each profession.

**Table 8:** Mean Tip-Tip pinch strength and standard deviation

Profession	Mean	Standard Deviation
Surgeons(n=50)	11.230.26	1.58
Dentist(n=50)	11.420.27	1.97
Physiotherapist (n=50)	10.290.28	1.99
Nurses(n=50)	10.310.22	1.59

Table 8, shows that the mean Tip-Tip pinch strength for surgeons is 11.230.26 and standard deviation of 1.58, for dentist the mean Tip-Tip pinch strength is 11.420.27 and standard deviation of 1.97, for physiotherapist the mean Tip-Tip pinch strength is 10.290.28 and standard deviation of 1.59, for nurses the mean pad-pad pinch strength is 10.310.22 and standard deviation of 1.59.

**Table 9:** Tip-Tip Pinch Strength between Groups

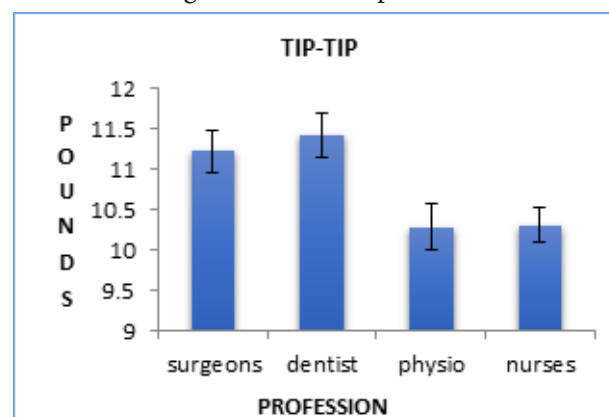
Groups		Mean Difference	P Value
Surgeons (11.23)	Dentists (11.42)	-0.19	p>0.05 (NS)
Surgeons (11.23)	Nurses (10.31)	0.92	p>0.05 (NS)
Surgeons (11.23)	Physiotherapy (10.29)	0.94	p>0.05 (NS)
Dentist (11.42)	Nurses (10.31)	1.2	P<0.05 (Sig)
Dentist (11.42)	Physiotherapy (10.29)	1.13	P<0.05 (Sig)
Nurses (10.31)	Physiotherapy (10.29)	0.02	p>0.05 (NS)

In table 9, shows Tip-Tip pinch strength between groups is estimated. The surgeons having mean Tip-Tip pinch strength of 11.23 compared with dentist having mean Tip-Tip pinch strength of 11.42 which had a mean difference of -0.19 with p value p>0.05 which is not significant. The surgeons having mean Tip-Tip pinch strength of 11.23 compared with nurses having mean Tip-Tip pinch strength of 10.31 which had a mean difference of 0.92 with p value P>0.05 which is not significant.

The surgeons having mean Tip-Tip pinch strength of 11.23 compared with physiotherapist having mean Tip-Tip pinch strength of 10.29 which had a mean difference of 0.94 with p value p>0.05 which is not significant. The Dentist having mean Tip-Tip pinch strength of 11.42 compared with nurses having mean pad-pad pinch strength of 10.31 which had a mean difference of 1.20 with p value P<0.05 which is significant. Dentist having mean Tip-Tip pinch strength of 11.42, compared with physiotherapist having mean Tip-Tip pinch strength of 10.29 which had a mean difference of 1.13 with p value P<0.05 which is significant.

The Nurses having mean Tip-Tip pinch strength of 10.31, compared with physiotherapist having mean Tip-Tip pinch strength of 10.29 which had a mean difference of 0.02 with p value P>0.05 which is not significant.

**Graph 4:** Shows difference in the mean Tip-Tip pinch strength between the professions



## DISCUSSION

Grip and pinch strength measurements are frequently used to provide an objective outcome measurement for hand injuries. They can also be used to gauge the need for further physiotherapy during hand rehabilitation [19]. Among all muscle function tests, measurement of hand grip strength has gained attention as a simple, non-invasive marker of muscle strength of upper extremities. For all professions grip strength is an important criterion to be successful in their profession [7]. Such phenomena may be explained by differences in the nature of work, the working environment, and the objects workers have to handle [6].

Dentistry is a specialized field in health care that requires repetitive motions of the fingers and, forceful pinching [20]. The occupation of the patient must be taken into account when using grip and pinch strength measurement in assessing the outcome in patients, impaired grip strength is an indicator of increased postoperative complications, increased length of hospitalization, and decreased physical status. The reliable and valid evaluation of handgrip strength is of great importance in determining the affectivity of different treatment strategies and procedures [3].

Surgery can be a physical occupation requiring a strong grip on hand operated instruments [15]. Instruments like bone drill, bone taps, screw drivers, bone holding forceps, peristome elevators, retractors, bone cutters, wire cutters, cast cutters, bone retractors, need involvement of very strong power grip exceptionally to accomplish the task [21]. In this study mean power grip strength of surgeons is significantly higher than other groups except nursing profession. Similar finding is seen in the study that orthopedic surgeons had statistically significantly greater mean grip strength than anesthetists. They concluded that Male orthopedic surgeons have greater grip strength than their male anesthetic colleagues because the latter group participates in less activity that requires grip strength [15]. In relative study to compare surgeons' hand strength with normative data from the Swiss population the result

demonstrated that surgeons were generally stronger compared to the Swiss population [22].

Nursing profession need power grip to Provide standing support to patient, ambulate client, Assist transfer of patient (e.g. bed to chair, bed to bed, chair to commode, clinical sites such as hospital or clients homes, Sustain repetitive movements (e.g. CPR, ambu bagging) [23]. So it is important that nurses need essential grip strength for successful in their profession. In current study there is no significant difference in power grip between surgeons and nurses. Physiotherapist needs good grip strength to perform patient's spinal and peripheral joint mobilization and manipulation, ambulation. Assisting with walking, transfers and safe mobility. When comparing both professions power grip there is only little difference in power grip strength. Dentist need more pinch strength rather than the power grip.

Dentist are required to maintain a high-level of precision during dental prophylaxis, especially manual scaling, involving high levels of force and precision in order to remove hard calculus from the relatively small area of the tooth's surface. It include repetitive hand motions, forceful pinching, sustained wrist postures, and vibration holding dental instruments may require a high level of pinch force.<sup>16</sup>Dental scaling requires hand motions different from those used in endodontic treatment; the instrument is pulled rather than rotated. However, both types of instruments require precision and a high level of pinch force. Most other non-powered hand instruments used routinely in dentistry, such as hoes and gingival margin trimmers, require a similar type of pinch grip and finger action as do periodontal instruments [24].

Current study shows mean pinch strength in all three pinch position, lateral pinch, pad-pad and tip-tip is significantly higher than other group except surgeons. It correlates with the pinch strength in dentist which measure the muscle activity of the flexor carpi radialis, brachioradialis, and extensor carpi radialis with surface electromyography during the daily work of dentist and found that the average muscle activity during dental scaling was 15 to 18 percent of the maximum voluntary contraction [25]. A related study that found the average pinch forces exerted during dental scaling were 11% to 20% percent of the maximum pinch strength, as estimated by electromyography [26]. Another study reported that the forces exerted during scaling ranged from 1.01 to 10.35 N with a mean of 5.70 N among 10 dentists [16].

For surgeons for performing there surgery the pinch strength is also important. They need pinch strength for stretch tissue in order to cut under control, to maintain desired tension on suture during procedure of suturing [27]. For holding clamps, dissecting knife, scalpels, forceps, needle holder, retractors, scissors, surgical hook, surgical needle, surgical stapler, tweezers surgeons need powerful pinching. In current study mean pinch strength all three pinches is not significant between the dentist and surgeons.

The nurses use pinch grip for Pick up objects (e.g. syringe), Grasp small objects (e.g. pills), use a computer, Pinch/pick or otherwise work with fingers (e.g. syringe, gloving, small equipment), Turn knobs with hands on equipment, Squeeze (e.g. eye dropper, IV tubing), Put on caps, gown, gloves, mask, Apply pressure (e.g. to a wound), Pinch/manipulate work with fingers (e.g. dressings), Grasp small objects with hands (e.g. IV tubing) [23]. The physiotherapy need pinch grip for gripping activities when using pen electrodes, Ultrasound, Massage, mobilization of distal joints like interphalangeal joints for both upper and lower limb. Lateral pinch is mostly used by both nursing and physiotherapy profession. When comparing both the profession grip strength there found to be little difference.

### Scope of the study

First of all, the design may be improved by using random sampling instead of convenient sampling so as to minimize sampling bias. The second point is that although a standardized procedure was followed during grip strength testing for each subject in this study, implementation of a blinding procedure by not allowing the investigator to know whether the test subject is from which group may help reduce possible tester bias. This is to eliminate the possible situation of the investigator either intentionally or unintentionally offering more verbal cues during the grip tests to a particular group of subjects, leading to unreliable results. Finally, female can be included in the study

### CONCLUSION

Surgeons have highest power grip strength followed by Nursing, Physiotherapy and Dental professionals. Dentists have the maximum pinch strength in all three positions, followed by Surgeons, Nurses and Physiotherapists. Surgeons have maximum pinch strength next to Dentists.

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