

# An analytical approach on postural deviation and health hazards of homemakers while dish washing

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■ **ABSTRACT** : For the study survey was conducted by interview method among 30 purposive randomly selected home makers having 5ft. to 5.5 ft. height range and one wall kitchen. The standing posture is adopted for the dish washing. The criteria chosen for evaluation were anthropometric measurement (height and weight), dimensions of the sink, heart rate, energy expenditure and postural deviation. The selected variables were correlated with independent variables. Postural deviation of body at cervical, lumbar and elbow joint of selected home makers was measured while cleaning utensils at sink in standing posture. The maximum postural deviation was found at lumbar point. Study revealed that correlation of depth of the bowl with cervical joint showed highly significant correlation for bowl depth of 14-18 cm (0.629\*\*) where as elbow joint showed significant correlation for bowl depth of 14-18 cm (0.494\*). Highly significant correlation was noted for tap height (20 – 40 cm) and postural deviation at lumbar joint and elbow joint (0.720\*\*and 0.838\*\*, respectively). It was observed that 46.66 per cent of homemakers were having normal BMI (20.5–25.0). It was also evident from the study that increase in heart rate of women increased the energy expenditure while dish washing at sink in standing position. Very severe pain was observed in shoulder while severe pain in back and neck was experienced by homemakers. None of the homemakers felt pain in wrist while dish washing at sink in standing posture.

■ **KEY WORDS** : Postural deviation, Dish washing, Energy expenditure, Standing posture

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**K**itchen occupies a central point in the home and the plan of it is a matter of concern and interest to entire family (Loganayaki and Saramma, 1992). To make a kitchen as a delightful place, care should be taken while arranging work areas in the kitchen which should aim at creating functional design and contribute to the smooth flow of kitchen work. Work places are a major part of the team that is needed to accomplish household basic. The quality and design of the work has an important effect on the ease with which the action is accomplished.

The design and placement of the sink require careful consideration of a number of factors it can reduce fatigue from work. According to Oberoi *et al.* (1987), comfortable design of the kitchen in the home is important in order to reduce the ergonomic cost of work and fatigue to minimum, maintenance of good posture and enhanced productivity. The

present study was undertaken with the objectives given below:

- To find out relation between postural deviation with sink dimensions.
- To know the musculo-skeletal problems faced by homemakers while using existing kitchen sink.

## ■ RESEARCH METHODS

Survey was conducted by interview method among 30 purposive randomly selected home makers having 5 ft. to 5.5 ft. height range and one wall kitchen from different localities of Parbhani.

The anthropometric measurements of homemakers were taken with the help of anthropometric tape. Shallow fry pan, one small vessel, four plates, four glasses and four catories were selected for cleaning in standing posture and taking heart rate of home makers.

The postural analysis of home makers was done by using the Goniometer and angle of deviation collected through the following method:

$$\text{Angle of deviation} = \text{Natural standing angle} - \text{working angle}$$

The angle of deviation was calculated at lumbar, cervical and elbow joint. For measuring the heart rate, the Polar sport tester heart monitor was used.

The collected data were statistically analyzed by applying correlation co-efficient test.

### ■ RESEARCH FINDINGS AND DISCUSSION

Postural deviation of body at cervical, lumbar and elbow joint of respondents was measured while cleaning utensils at sink in standing posture. It was observed that higher deviation was recorded at lumbar joint, the maximum angle of postural deviation was 76° and minimum angle of deviation was 34° with average mean 57.45 and 10.47 standard deviation. The maximum angle of deviation was recorded at cervical joint which was 59° and minimum was recorded *i.e.* 22° with average mean 46.9 and 9.92 standard deviation. The maximum angle of deviation at elbow joint was 67° and minimum angle of deviation observed was 30°. The mean and standard deviation of elbow joint was 55.63 and 10.28, respectively.

It can be concluded that the maximum postural deviation was found at lumbar joint. The reason for maximum deviation at lumbar joint was observed that width of front projection was more. The finding is in line with the results of Khatoon and Dayal (2009) that maximum deviation in body angle 52° was found to be in scrubbing the utensils activity followed by 43° in rinsing utensils.

Table 1 discloses correlation of postural deviation with sink dimensions. It is clear from the table that there was no significant correlation of angle of deviation at cervical, lumbar and elbow joint, with sink dimensions *i.e.* sink height from floor, length of sink, breadth of sink and height of sink.

Correlation of depth of the bowl with cervical joint revealed highly significant correlation for bowl depth of 14 – 18 cm (0.629\*\*) and 19 and above cm depth showed negatively significant correlation (- 0.600\*). Where as correlation of depth of the bowl with elbow joint showed significant correlation for bowl depth of 14 –18 cm. (0.494\*) implying that if the depth of bowl increases the angle of deviation at cervical and elbow joint also increases.

Highly significant correlation was noted for tap height and postural deviation at lumbar joint and elbow joint (0.720\*\* and 0.838\*\*, respectively) for the group 20 – 40 cm. tap height infesting that as the tap height increases the

**Table 1: Correlation of postural deviation with sink dimension**

Sr. No.	Sink dimension (cm)	Angle of deviation		
		Cervical joint	Lumbar joint	Elbow joint
1.	<b>Sink height to floor</b>			
	76 – 80 (40)	- 0.285 <sup>NS</sup>	- 0.304 <sup>NS</sup>	- 0.199 <sup>NS</sup>
	81 – above (60)	- 0.395 <sup>NS</sup>	0.193 <sup>NS</sup>	0.246 <sup>NS</sup>
2.	<b>Depth of the bowl</b>			
	14 – 18 (53.33)	0.629 **	0.448 <sup>NS</sup>	0.494*
	19– above (46.66)	- 0.600**	- 0.425 <sup>NS</sup>	-0.269 <sup>NS</sup>
3.	<b>Tap height</b>			
	20 – 40 (30)	0.324 <sup>NS</sup>	0.720**	0.838**
	41- above (70)	0.103 <sup>NS</sup>	0.234 <sup>NS</sup>	0.203 <sup>NS</sup>
4.	<b>Front projection</b>			
	6 – 14 (76.66)	0.046 <sup>NS</sup>	0.132 <sup>NS</sup>	0.017 <sup>NS</sup>
	15– above (23.33)	0.701 <sup>NS</sup>	0.923**	0.943**
5.	<b>Length</b>			
	30 – 33 (43.33)	- 0.100 <sup>NS</sup>	- 0.060 <sup>NS</sup>	0.020 <sup>NS</sup>
	34– above (56.66)	- 0.018 <sup>NS</sup>	0.255 <sup>NS</sup>	0.059 <sup>NS</sup>
6.	<b>Breadth</b>			
	30 – 37 (43.33)	- 0.091 <sup>NS</sup>	-0.166 <sup>NS</sup>	-0.136 <sup>NS</sup>
	38– above (56.66)	- 0.039 <sup>NS</sup>	-0.042 <sup>NS</sup>	-0.037 <sup>NS</sup>
7.	<b>Height</b>			
	14 – 24 (76.66)	0.360 <sup>NS</sup>	0.120 <sup>NS</sup>	0.082 <sup>NS</sup>
	25– above (23.33)	- 0.576 <sup>NS</sup>	- 0.451 <sup>NS</sup>	-0.450 <sup>NS</sup>

Figures in parenthesis indicates percentages \*\* indicate significance of value at P=0.01, NS=Non-significant

deviation at lumbar joint and elbow joint increases.

A highly significant correlation was noted for front projection of sink and postural deviation at lumbar and elbow joint for the group 15 and above cm projection (0.923\* and 0.943\*). Verma (2010) showed similar findings for length, breadth and height of sink with the postural deviation at cervical and elbow joint.

Correlation between heart rate and energy expenditure of selected home maker while dish washing is shown in Table 2. It is clear from the table that as heart rate increased, the energy expenditure of home maker also increased while dish washing in standing posture. Statistically it was observed that heart rate was positively correlated with energy expenditure while dish washing with age group 20 to 30 years (r=0.999\*\*), 31 to 40 years (r=0.999\*\*) and 41 years above (r= 0.797\*\*). It is evident from the table that increase in heart rate of women increased the energy expenditure while dish washing at standing position.

**Table 2: Correlation between heart rate and energy expenditure of selected home makers while dishwashing**

Sr. No.	Age (years)	Mean working heart rate (Beats/Min)	Mean working Energy expenditure (kj/min)	R value
1.	20-30	110.1	8.50	0.999**
2.	30-40	107.0	8.19	0.999**
3.	40-50	108.1	8.76	0.797**

\*\* indicate significance of value at P=0.01

Based on weight and height of the women, BMI of the selected home maker was calculated using the formula to assess the physical fitness of the subjects. The results indicated that BMI of the selected sample ranged from 6.66 to 46.66. On the basis of BMI, subjects were classified for the physical fitness and results are indicated in Table 3.

It is clear from the results of Table 3 that majority of the respondents (46.66 %) had normal physical fitness in the range of 20.5 to 25 BMI followed by 23.33 per cent were in obese grade I with BMI ranging between 25 to 30. Ten per cent of home makers were having chronic energy deficiency and obese grade II fitness ranging from <16 to 18.5 and >30 BMI, respectively. It is clear from the table

**Table 3: Physical fitness of selected homemakers**

Sr. No.	Interpretation of score	Score of BMI	Frequency (Percentage) (n = 30)
1.	Chronic energy deficiency	< 16 – 18.5	3 (10)
2.	Low weight (Normal)	18.5 – 20.5	2 (6.66)
3.	Normal	20.5 – 25.0	14 (46.66)
4.	Obese grade I	25.0 – 30.0	7 (23.33)
5.	Obese grade II	> 30.0	3 (10)

that minimum per cent of the respondents (6.66 %) were in low weight (normal) BMI ranging between 18.5 to 20.5. From the above findings it can be inferred that vast majority of the selected home makers were having normal and obese grade I physical fitness.

Information on musculo-skeletal problem of selected home makers while dish washing in standing posture is disclosed in Table 4. It is evident from the table that very severe pain in shoulder was reported by 6.6 per cent home makers whereas mild and very mild pain in shoulder was observed by 3.3 per cent home makers. Severe pain in back and neck was reported by 6.6 per cent home makers whereas mild and very mild pain in back and neck was reported by 3.3 per cent home makers. It was also noticed that 3.3 per cent home makers experienced moderate pain in muscle and pain in foot. Mild pain in muscle and foot was experienced by 6.6 per cent home makers whereas 6.6 per cent and 10 per cent homemakers observed very mild pain in muscle and foot, respectively. On the whole it can be concluded that the severity of pain in different body parts was experienced by home makers for pain in shoulder. None of the home makers felt pain in wrist while dish washing at the sink in standing posture.

**Conclusion:**

Postural deviation of body at cervical, lumbar and elbow joint of selected home makers was measured while cleaning utensils at sink in standing posture. The maximum postural deviation was found at lumbar point. Study revealed that correlation of depth of the bowl with cervical joint showed highly significant correlation for bowl depth of 14-18 cm (0.629\*\*) where as elbow joint showed significant correlation for bowl depth of 14-18 cm (0.494\*). Highly

**Table 4 : Musculo skeletal problems of selected homemakers while dishwashing in standing posture**

Sr. No.	Body part	5 Point scale				
		Very severe 5	Severe 4	Moderate 3	Mild 2	Very mild 1
1.	Pain in back	---	2 (6.6)	---	1 (3.3)	1 (3.3)
2.	Pain in shoulder	2 (6.6)	---	---	1 (3.3)	1 (3.3)
3.	Pain in muscles	---	---	1 (3.3)	2 (6.6)	2 (6.6)
4.	Pain in wrist	---	---	---	---	---
5.	Pain in foot	---	---	1 (3.3)	2 (6.6)	3 (10)
6.	Pain in neck	---	2 (6.6)	---	1 (3.3)	1 (3.3)

significant correlation was noted for tap height and postural deviation at lumbar joint and elbow joint (0.720\*\* and 0.838\*\*, respectively).

It was observed that 46.66 per cent of homemakers were having normal BMI (20.5–25.0). It was also evident from the study that increase in heart rate of women increased the energy expenditure while dish washing at sink in standing position. Very severe pain was observed in shoulder while severe pain in back and neck was experienced by home makers. None of the home makers felt pain in wrist while dish washing at sink in standing posture.

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